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- PERIODIC HEALTH EXAMINATIONS: A LONG-TERM STUDY, 1949-1959.....*S. C. Franco, M.D., A. J. Gerl, M.D., and G. T. Murphy, M.D.*
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1. Greene, C. C., Jr., and Beaver, G. T.: Journal of Occupational Medicine *2:363, 1960. 2. Influenza Fact Sheet: Public Health Service, U. S. Dept. of Health, Education and Welfare, August 1, 1960. 3. Burney, L. E.: Correspondence,* J.A.M.A. 174:*438, 1960.*

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TETANUS IN INDUSTRY—THE PROBLEM WITH PARTICULAR REFERENCE TO IMMUNIZATION PROGRAMS
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The manuscript, including references, footnotes, and legends for illustrations, should be typed on one side of a standard-sized page of opaque paper, double-spaced, and with at least a one inch margin at each edge. One carbon copy should accompany the original typescript, and the author should retain a carbon copy for use in reading proofs.

The authors' names should be accompanied by the highest academic or medical degrees that they hold; letters indicating membership in honor or professional societies will not be published. Authors who are in the armed services should not use civilian degrees in connection with their names. The city of each author should be supplied, and an address should be provided at the end of the manuscript for the use of readers who may wish to communicate with the senior author. If academic, hospital, or industrial connections are given for one author, they must be given for all other authors who have such connections. The authors are responsible for obtaining permission from the proper authorities to use the names of institutions.

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46th Annual Meeting

Industrial Medical Association

April 11, 12 and 13, Los Angeles, Calif.

Intensive Refresher Courses to be Added Feature of IMA Annual Meeting

The Chairman of the Program Committee for the 1961 convention and annual meeting, Jean S. Felton, M.D., has announced the completion of arrangements for a distinctive new type of scientific session in the program of the annual meeting.

Two-hour concentrated study and discussion sessions will be scheduled in several topics for Tuesday and Wednesday mornings. Classes will be strictly limited to 40 for each session. Those wishing to participate must register in advance by letter addressed to the Industrial Medical Association, 28 East Jackson Boulevard, Chicago 4, Ill., indicating session preferences. All requests will be acknowledged, and tickets of admission will be reserved—to be picked up at the convention registration desk in the Biltmore Hotel at the time of registration. Tickets must be picked up by 5:00 P.M. of the afternoon preceding the morning session, otherwise those not picked up will be made available to others wishing to attend. There is no registration charge for these intensive refresher courses.

The dates, time, subjects, and instructors for these sessions are as follows:

Tuesday morning, April 11

A. Cardiology in Industry—Richard Call, M.D.

B. Treatment of Persons with Excessive Deposition of Radioisotopes—Gould A. Andrews, Jr., M.D.; Harry Foreman, M.D.; W. D. Norwood, M.D.; George L. Voelz, M.D.

C. Surgery Clinics

1. Fractures and Crush Injuries of the Forearm and Hand—James N. Wilson, M.D.
2. Problems of the Back—Homer C. Pheasant, M.D.
3. Injuries of the Leg and Ankle—John C. Wilson, M.D.

Wednesday Morning, April 12

D. Dermatology in Industry—Raymond R. Suskind, M.D.

E. Hearing Conservation in Industry—Aram Glorig, Jr., M.D.

Post-Conference Hawaiian Tour Itinerary and Scientific Program

Arrangements for an excellent scientific program have been completed, details below. In addition, the basic tour includes 7 days devoted to a nice balance of sightseeing and free time described here in very condensed version, due to space limitations.

Friday, April 14: Jet plane to Honolulu—4 hours. Hotel—Hawaiian Village. Tour of City.

Saturday, April 15: Free time.

Sunday, April 16: Free time. Luau (native feast) evening.

Monday, April 17:

9:00 A.M.—Meeting at Hawaiian Sugar Planters' Association Experiment Station.

9:10 A.M.—"Radio-active Isotopes in the Sugar Industry"—Dr. George Burr, Principal Physiologist and Biochemist, HSPA.

9:30 A.M.—"Chemicals Used in the Sugar Industry, and Control"—Dr. Kenneth O. Sund, Sr., Chemist, HSPA.

10:00 A.M.—Movie of mechanization of the sugar industry—R. A. Duncan, Chief Engineer, HSPA.

10:30 A.M.—Tour of Experiment Station—Dr. L. D. Baver, Director, Experiment Station Staff.

Tuesday, April 18:

9:30 A.M.—Meeting at Oahu Sugar Company Social Hall, Waipahu.

9:40 A.M.—Oahu Sugar Company Medical Plan—Dr. R. Y. Noda, Medical Director.

10:30 A.M.—Tour of the Oahu Sugar Company mill.

1:00 P.M.—Meeting at Pearl Harbor Submarine Base. Conducted by Capt. Harry J. Alvis, Force Medical Officer, U. S. Submarine Force, Pacific Fleet.

1:10 P.M.—"Medical Aspects of Duty Aboard a Nuclear Submarine"—Commander A. McKeen.

1:30 P.M.—"Medical Aspects of Diving Injuries" — Capt. Alvis.

1:50 P.M.—"Spinal Cord Injuries from Diving"—Lt. J. J. Cosgrove.

2:10 P.M.—Demonstration—submarine escape training.

2:40 P.M.—Tour of Pearl Harbor.

Wednesday, April 19:

9:00 A.M.—Meeting at Dole Corporation auditorium.

9:05 A.M.—"Dermatological Hazards of the Pineapple Industry"—Dr. Claude V. Caver.

9:35 A.M.—"Industrial Nursing in Dole Corporation Pineapple Cannery"—Mrs. Clara McCue, R.N.

9:50 A.M.—"Safety Program at Dole Corporation, Ltd."—I. A. Witt, Safety Director.

10:10 A.M.—Tour of Dole Corporation Pineapple Cannery under direction of David Eyre, Industrial Relations Director.

Thursday, April 20: Free time in morning. Fly to island of Kauai. Hotel—Kauai Surf. Free time later.

Friday, April 21: Sightseeing on Kauai—Waimea Canyon, Kalalau Lookout, Hanalei Valley, Beaches, Cruise on Wailua River to Fern Grotto.

Saturday, April 22: Fly to Hilo on island of Hawaii. Visit orchid and anthurium farm, Hawaii National Park, Volcano House at active Kilauea Crater, and Kailua on the Kona Coast. Hotel—Kona Inn.

Sunday, April 23: Return to Honolulu in afternoon for return flight to U.S. Passengers returning by ship transfer to S. S. Matsonia, leaving at 4:00 P.M., arriving Los Angeles, morning, April 28.

Additional time may be spent in the Islands on an optional basis.

A detailed tour brochure will be mailed to all members of the Association soon. In the meantime, inquiries and reservations may be sent to International Travel Service, Palmer House, Chicago. Be sure to mention the American Industrial Health Post-Conference Tour.

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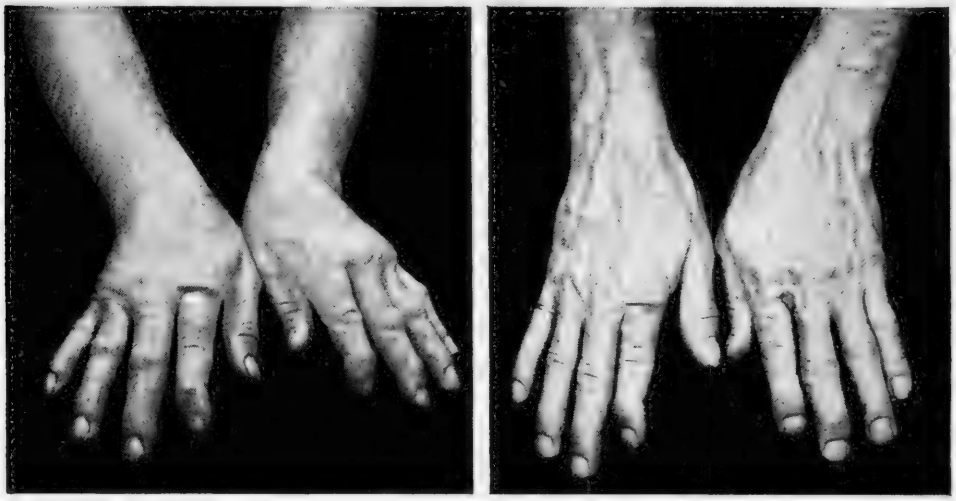

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Journal of Occupational Medicine

World Health and Industrial Medicine

Leslie W. Knott, M.D., and Henry N. Doyle, Washington, D.C.

TO THOSE of us in public health administration, industrial medicine, representing a fusion of the medical and social sciences, possesses a remarkable potential for the advancement of adult health. We have been interested to assess this potential in relation to the extensive programs in world health now being carried on.

Health Problems in Emerging Countries

To view this potentiality in microcosm, let us consider, for example, one of the newer developing countries, Ghana, as recently described in a report of the World Health Organization. In the fishing village of Tema, in Ghana, a modern port is being constructed. Industries will be built up in this area, and these industries will need workers. Production presupposes reasonably healthy workers, able to function efficiently. But Tema's workers will be far from healthy according to our standards. Most will be suffering from malnutrition, and few will be free of such plagues as tuberculosis, yaws, leprosy, and malaria.

Biostatistics for Africa as a whole show that, of its population of 155 million, 2.3 million are lepers; 20 million are afflicted with onchocerciasis, or river blindness; 12 million are suffering from yaws, a disfiguring and mutilating disease, and 100 million are exposed to malaria.[1]

Presented before the 1960 Industrial Health Conference, Rochester, N. Y., April 28, 1960.

Dr. Knott is Assistant Chief, Division of Special Health Services, and Mr. Doyle is Chief, State Services Branch, Division of Occupational Health, Public Health Service, U. S. Department of Health, Education, and Welfare.

At present, two out of every three of the 2.7 billion persons in the world live in the emerging or underdeveloped areas. With few exceptions, their basic economy is agricultural and produces less than one-third of the world's income. Yet, these areas, beset by economic poverty, widespread illiteracy, and human illness, have both the natural resources and the manpower for creating wealth.[2]

Clearly, the vast industrial resources and raw materials of these areas cannot be fully utilized until their health problems are solved. The solution of these problems is of concern to people everywhere. The world cannot continue its present high standards of living without soon drawing on the resources of Africa and the other emerging areas.

In his report on "The Cost of Illness and the Price of Health," Dr. C.-E. A. Winslow reminds us of another stake in world health. In his words, "The 20th Century faces on a global scale the same problem which Chadwick faced on a national scale a century ago. He recognized that London could not continue to exist half rich and half poor, half sick and half well. Today men realize that the united world which they desire to build cannot be established and maintained by constituent nations handicapped by overwhelming burdens of poverty and disease."[3]

Where does industrial medicine enter the struggle to break the chains of disease and to initiate an upward trend of socioeconomic evolution. First of all, industrial progress itself generates the income necessary to cope with disease. With wages, workers tend to provide for themselves the basic elements of good health: housing, food, and medical care. But,

at the same time, industrialization can also generate health problems. It was in this resultant need for medical and engineering control of the work environment that industrial medicine had its inception.

History has amply demonstrated that, when industrial medicine and other environmental and preventive health services have progressed hand in hand with industrialization, there have been no major problems. However, in the less-developed countries which are now undergoing rapid industrialization and urbanization, these services have lagged far behind, with ill consequences.

To cite a recent example, it is a tragic irony that in many parts of the world the vast irrigation schemes constructed with the aim of improving the standard of living have had the effect of undermining the health of the country. The network of canals designed to carry water to arid territories have proved ideally suited for carrying bilharziasis, or snail fever, to the inhabitants. Yet, before the introduction of perennial irrigation, bilharziasis was almost unknown in many of these areas.[4]

Health Provisions in Industry

It is in these newly developing countries that industrial medicine faces one of its greatest needs and challenges. Although the more industrialized parts of the world have by no means solved all their problems, their longer experience has at least provided a basic framework for effective action. A fairly optimistic picture of the situation has been painted in a report by the World Health Organization[5] covering the period 1954-1956. According to the report:

Very few countries that today have reached a high status of industrial development are without a comprehensive organization for research into matters of health and safety. A large number enforce legislation for the prevention of occupational disease and accidents. Preemployment and periodic medical examinations are frequently required for young workers and for those whose occupations involve certain special hazards, such as contact with silica and exposure to radioactivity. In the majority of countries, provision has been made for factory inspection, generally under the ministry of labor, as in Japan, Norway, and the United Kingdom. In a considerable number of countries, on the other hand, responsibility for occupational health is assumed by the ministries of public health, as in Argentina, Chile, Mexico, Peru, and other countries of Latin America. In Australia and New Zealand industrial health services are integrated with the state health departments, while in the Union of Soviet Socialist Republics and Yugoslavia occupational health supervision is the responsibility of regional public health offices. Some of these countries have separated the inspectorate from the health section, as in the case of Egypt. In France, legislation has been enacted to extend the scope of factory inspection, and in 1946 the law required that, regardless of size, every factory should establish a systematic medical service. Employers are obliged to provide facilities for annual medical examinations of the workers, first-aid services, and a special system of job placement. In the United States, as you know, the factory inspection services of labor departments have no medical functions. They work closely with occupational health units, which, with few exceptions, are located in health departments.

The report also points out that a growing number of countries provide general medical care for workers, and this system is perhaps more advanced than many other health services. Many of the health insurance systems started by covering occupational groups, extending later to wider sections of the population. This gradual coverage has applied to the United Kingdom, Japan, Turkey, India, and other nations. Many large industries have provided their own insurance and compensation systems, and some special industries are required to do so by law—such as, for example, rubber- and tea-growing on the estates in Malaya and Ceylon.

The impact and direction of industrial medicine throughout the world has been further reported by Dr. Sven Forssman, Professor of Industrial Medicine at the University of Stockholm. To illustrate the reduction of occupational diseases in specific occupations, he cites the fact that, while lead poisoning was common 50 years ago among painters and printers, such poisoning is now rare in most countries. On the other hand, he reminds us of the need for continuous vigilance by observing that lead poisoning is now found in many countries among workers producing or repairing storage batteries.[6]

Tracing the evolution of occupational health, Dr. Forssman describes the growing interest in human engineering, or biotechnology, and in mental health and human relations in industry. He also sounds a note of warning about the rapid industrialization in various parts of the world—industrialization that is taking place in a period of a few decades, instead of a hundred years as in Europe. He cautions that serious health problems, especially mental and social, will be created by the pressures on

people to adapt too rapidly to new conditions, and that industrial health services should be organized in time to forestall these hazards.

As one views the situation in different parts of the world, I think an inescapable conclusion is that industrial medicine must properly assume different functions in the various countries, depending on their economic and social development. In our own country, for example, in the early days of the railroads, industrial medical services of necessity encompassed complete medical care because of the remote, isolated areas in which the workers found themselves. Similarly, American companies developing resources in some foreign countries have had to provide a broad spectrum of services. The uniqueness of some of the problems facing American industry abroad has given rise to special forums, such as the conferences on industry and tropical health, sponsored by the Harvard School of Public Health.

Availability of Health Resources

One index of the size of the job that devolves upon industrial medicine is the availability of other health resources. Since, broadly speaking, the distribution of physicians reflects the degree of industrial development and per capita income of a country, we cannot expect an abundance of such resources in the underdeveloped areas. The ratio of less than 1,000 inhabitants per physician is found predominantly in European and North American countries, as well as in Argentina, Uruguay, Australia, New Zealand, Japan, the United Soviet Socialist Republics, and Israel. Excluding Israel, with its heavy concentration of refugee physicians, there is a range of 1 physician to every 610 persons in Austria and the U.S.S.R. to 1 per 960 inhabitants in France. The United States lies between with a ratio of 1 physician to every 790 persons.

The 1,000 to 5,000 inhabitants per physician category includes the remaining European countries and the majority of South and Central American countries. Africa is represented by Egypt and the Union of South Africa; the Near East by Turkey and Syria; the Pacific area by a few small countries or territories with close association with the Western powers.

In the 5,000 to 20,000 inhabitants per physician category, we find the remaining Central American countries and various countries in Africa, the Near East, Far East, and Pacific area, including India, Burma, and Pakistan.

The category of over 20,000 inhabitants per physician is made up of underdeveloped countries in central Africa, Saudi Arabia, and Yemen in the Near East, Vietnam, Cambodia, and Laos in the Far East. In some of these underdeveloped countries, the ratio is as low as 1 to every 50,000 of population.[7] Thus, we find that about one-third of the world population is served by about two-thirds of the medical personnel.

It is therefore not unreasonable that in the newly developing areas one of the first demands placed on industrial medicine is to provide not only basic public health services but also medical care that would ordinarily be the prerogative of the private physician. The realities of this situation were recognized by a Joint Committee on Occupational Health of the International Labor Organization and the World Health Organization in its report on the responsibilities facing industrial medicine throughout the world.[8]

Among other problems, the report referred to that of communicable diseases among workers. In nearly all countries, tuberculosis is a serious communicable disease. In some areas, other communicable diseases, such as typhoid fever or diphtheria, may create problems, and routine measures of public health must be applied to avoid their spread in industry. For intestinal parasite infestation, trachoma, yaws, and other diseases highly prevalent in some areas, the report suggested that effective treatment at low cost can be provided through the place of work.

The nutrition of workers is also portrayed as a concern of occupational health programs. Although proper nutrition depends on the total economic and social situation, industry can assist in gaining this end, at the same time benefiting through higher productivity.

Outlook for Occupational Health

The current philosophy of health throughout the world would seem to give strength to occupational health. Competent observers have described the world of the 20th century as science- and health-minded. People everywhere are looking to science to help them achieve still better health. Mankind is no longer resigned to sickness and disability.[2]

This outlook will undoubtedly contribute toward a greater acceptance throughout the world of a preventive-oriented concept of occupational health as we know it today in the United States and other highly industrialized countries. As interpreted in these countries, industrial medicine represents preventive health at its best. Evidences of progress in this direction are discernible in thinking and actions of health officials of some of the emerging countries. The remarks of the State Health Minister of Calcutta are perhaps significantly illustra-

tive. Opening the second Asian Conference of Occupational Health last November, he stated that occupational health should concern itself not only with the prevention of disease and reduction of industrial hazards, but also with the promotion of educational programs among the worker because physically and mentally alert workers are an asset to any industry.[9]

The concept of broad occupational health or industrial medical programs, with strong preventive features, has been vigorously promoted by such international associations as the World Health Organization and the International Labor Organization. The World Health Organization is interested in the health of all peoples, including the special problems of those who work. The International Labor Organization, on the other hand, is concerned with all aspects of the welfare of workers, including their health problems. In the field of occupational health, they have a common meeting ground and have frequently allied themselves in joint projects.

Last year, as you are probably aware, the International Labor Organization developed and adopted a new international instrument concerning the organization of occupational health services in places of employment. It was recommended that these essentially preventive services should be organized by employers themselves or attached to an outside body, either as a separate service within a single undertaking or a service common to a number of undertakings. The model objectives listed in the recommendation were: (1) protecting workers against any health hazard which may arise out of their work or the conditions in which it is carried on; (2) contributing toward the workers' physical and mental adjustment, in particular by the adaptation of the work to the workers and their assignment to jobs for which they are suited; and (3) contributing to the establishment and maintenance of the highest possible degree of physical and mental well-being of workers.[10]

Another recent contribution of the International Labor Organization, which has perhaps already come to your notice, is the establishment, in cooperation with the International Social Security Administration, of an International Occupational Safety and Health Information Center. The Center will provide an abstracting service which hopes to achieve worldwide coverage of significant occupational safety and health literature and legislation. The United States supported the establishment of this center when the matter was considered and approved by the International Labor Organization.

A national center will be designated in each participating country to serve as liaison with all interested organizations and to assume responsibility for abstracting the national literature and for promoting the abstracting service. This abstracting service promises to fill an increasingly felt need for up-to-date information on materials, processes, equipment, and problems in the various countries, and you will undoubtedly be hearing more about it from your association.

A wide range of activity is also being carried on by the World Health Organization in its efforts to encourage public health agencies to participate in worker health protection and to promote the organization of general health and medical services for workers in industrial establishments. Its program includes granting training fellowships, conducting special studies, providing consultant services, exchanging information, and organizing conferences and training courses.

One of the needs highlighted by the World Health Organization, especially in its European seminars, is the coordination of public health and occupational health. In those countries in which public health and occupational health have traditionally developed along separate lines, we find emphasis on compensation and environmental control rather than preventive medicine.

Role of Training Programs

Our training programs for foreign students in the United States would logically afford an excellent opportunity for enlarging occupational health concepts that have been restricted by these differences in culture and tradition. Actually, however, our industrial medicine courses, by not focusing sufficiently on public health, have failed to broaden the vision of these foreign students. This failure to grasp the whole occupational health picture has been apparent time and time again when our personnel have visited other countries. As an example, in one country to which we gave consultation, the industrial medical authority was greatly exercised about byssinosis in a textile plant but totally unconcerned about the plant's unsafe water supply, the use of a common drinking pail, the lack of sanitary facilities, and the absence of even minimum first-aid facilities. This physician had special training in occupational health in the United States. Such observations suggest that we are producing technicians rather than industrial medical specialists of broad vision. We may very well need to look more closely at these training programs.

Practically all of the training offered in the United States to foreign students is through the sponsorship of an international agency. It may generally be classified as (1) university training in a school of public health with emphasis on industrial medicine and (2) short-term training through official agencies. Both have their shortcomings. In the academic course, the foreign student is studying 20th century industrial medicine which frequently fails to consider the basic sanitation and environmental health problems that will confront him. A further shortcoming of the official courses is that they are generally restricted to field observations. The student is here for only a short period, and frequently the official agency has no time to plan for his training.

America's Contribution to World Health

Training, of course, is but one facet of this country's interest in world health. The United States Government contributes significantly to world health through its activities in the United Nations and its specialized agencies, notably the World Health Organization, as well as in the International Labor Organization. American health service activities abroad in underdeveloped areas are a responsibility of the International Cooperation Administration, working in conjunction with the Department of State. The International Cooperation Administration has been especially active in promoting the establishment and strengthening of occupational health programs in South America.

Congressional interest in world health, as reflected in the creation of a special committee to study all aspects of international health, research, rehabilitation, and assistance programs, extends beyond American support of the work of these organizations. Recently, as you may recall, it was proposed that a National Institute for International Research be established, to supplement the existing institutes of health. There has also been congressional support for the designation of an International Health Year as a means of developing intensive international cooperation in the field of health.

The massive attacks on various categorial diseases now under way by the National Institutes of Health may be expected to benefit not only our own country but the rest of the world as well. Medical discoveries, we know, transcend national boundaries. Similarly, the occupational disease and toxicologic research of the Occupational Health Program of the Public Health Service contributes to protection of worker health everywhere.

Still another boost to international research is being made through the Public Health Service's interchange of scientific personnel and information, the support of international scientific assemblies, and the awarding of grants for research projects in other countries. Private projects, such as CARE, Medico, and the White Fleet, are also significantly advancing the international battle against disease.

The importance of industrial medicine in the total world health picture found further expression in July, 1960, when the 13th International Congress on Occupational Health was held in this country. Several members of the Industrial Medical Association served on the Organizing Committee for the Congress, the first to be held in the United States. It represented an unequalled opportunity to describe to the world the progress made in industrial medicine and hygiene in the United States and to exchange views on common problems.

We can take pride in the fact that, as a nation, no people have contributed more generously through private and public means to the health of the human family than have the American people. But a monumental job remain to be done in all sectors. Workers in industrial medicine can take satisfaction in helping the emerging countries enter the 20th century without the tragic toll of health and life that characterized the birth of industrialization. People everywhere are hungering to experience a vibrant sense of well-being and to live and work in top form. And let us not forget, a healthier, happier world is a more secure world. Industrial medicine is one of the keys to such a world.

Summary

Industrial medicine possesses a remarkable potential for the advancement of health throughout the world. As we view conditions in newly emerging nations, we find widespread poverty, illiteracy, and human illness, even though resources for the creation of wealth do exist. The development and utilization of these resources concern people everywhere as they strive to promote high standards of living. Increased production through industrialization, however, is feasible only to the extent that there are available reasonably healthy workers who are able to function efficiently. Because of a shortage of all kinds of medical facilities in the newly developing areas, demands are placed on industrial medicine not only to provide basic public health services, but also to furnish medical care that would ordinarily be the prerogative of the private physician.

Few countries that have reached a high status of industrial development are without a comprehensive organization for research into

matters of health and safety. A preventive-orientated concept of occupational health is finding greater acceptance and is being promoted by such international associations as the World Health Organization and the International Labor Organization. Ideally, occupational health programs would include protection against health hazards arising from the work situation, consideration for the worker's physical and mental adjustment, and preventive services directed at the maintenance of his general well-being.

America participates in the training of students and in other world health activities through the United Nations and such agencies as the International Cooperation Administration. International research is promoted through governmental as well as private projects. Although much has been done, workers in industrial medicine have a challenging job ahead in helping the emerging countries reap the benefits of industrialization without the grim effects on health that accompanied its beginnings.

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THE FIRST INTERNATIONAL CONGRESS ON ERGONOMICS

will be held

August 20-23, 1961, in Stockholm, Sweden

The theme of the Congress will be "Adjustment of Work and Working Environment to Man." The program, which is planned for specialists in the different field of ergonomics, will be devoted to the following subjects: Speed of Work and Ergonomics; Adjustment of Working Environment to the Aging Population; and Ergonomical Job Analysis (evaluation of work and working environment from the ergonomical point of view).

The Organizing Committee, under the chairmanship of Dr. Sven Forssman, invites the submission of papers for presentation at the Congress. Papers may be presented in English, French or German, and must include a summary not exceeding 200 words. Abstracts of papers for presentation should be in the hands of the Organizing Committee before March 1.

Correspondence concerning the Congress should be sent to Professor Sven Forssman, Svenska Arbetsgivareforeningen, Postbox 16120, Stockholm 16, Sweden.

The Toxicity of Titanium Tetrachloride

James J. Lawson, M.D., New Johnsonville, Tenn.

TITANIUM tetrachloride is an important intermediate in the production of titanium metal and certain pigments. In the pure form, it is a colorless liquid that fumes strongly in moist air, forming a dense and persistent white cloud. From a clinical point of view, its most important characteristic is that it reacts violently with water to liberate heat and produce hydrochloric acid. These thermal and corrosive effects have apparently been responsible for all of the injuries reported to date, and have resulted in either contact burns on body surfaces or pulmonary irritation from inhalation of the fumes.

I. Liquid Titanium Tetrachloride

Effect of Direct Contact

Foulger and Zapp[1] reported that the application of liquid titanium tetrachloride to the skin of guinea pigs resulted in second-degree thermal burns. The effect appeared to be entirely a corrosive one. Experience has shown that most corrosive chemicals are best removed by washing with water. However, in case of this chemical severe localized burns may result because of the intense exothermic reaction between titanium tetrachloride and water. The following case histories illustrate this effect:

CASE 1—A 35-year-old man was sprayed with a large quantity of liquid titanium tetrachloride. Although he was drenched with water from a safety shower within seconds, he still suffered third-degree burns on his feet, abdomen, lower lumbar, pilonidal, perirectal, and pubic areas, as well as the glans penis. These burns were deep and healed slowly, skin grafting being required on one foot. The most intense burns occurred in areas where there was occlusion by a belt, shoe, or approximating skin surface. Fig. 1 illustrates the pattern over the lumbar and perianal areas. Apparently water spattered on liquid titanium tetrachloride coating the skin, collected behind the belt, and ran down into the pubic area. Fig. 2 shows the effect on the dorsum of the left foot.

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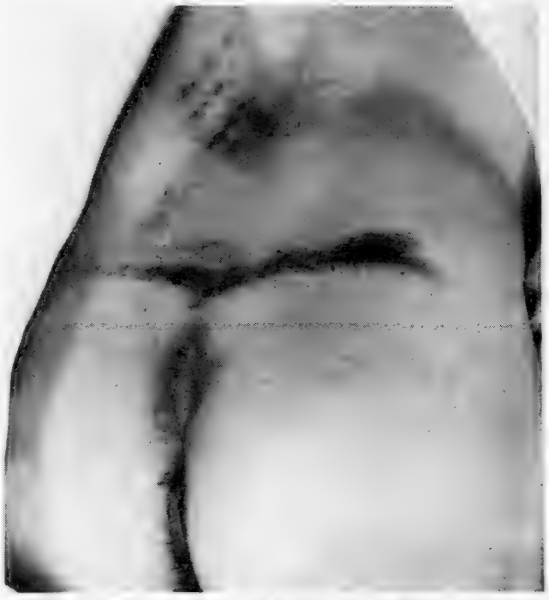

Fig. 1—Titanium tetrachloride burn. Note pattern at belt line and funnel effect leading to perianal area.

Fig. 2—Titanium tetrachloride burn. Note depth of tissue destruction.

CASE 2—A 43-year-old man was sprayed with liquid titanium tetrachloride while wearing a full acid suit with a hood. When he attempted to wash off the chemical under a safety shower, the heat generated became so intense that he was forced to remove the acid suit. While under the shower, he suffered a third-degree burn of his hand.

CASE 3—A 50-year-old man had been drenched from the waist down with the liquid chemical while wearing ordinary clothing. A portion entered his right shoe. A fellow worker began to spray him with water from a hose, allowing some of it to enter his shoe. Upon contact of the chemical with the water, he suffered a third-degree burn on his ankle.

In these three cases, later observation revealed a deep brown pigmentation, which appeared about the periphery of the scars and in areas of healed second-degree burn. This condition would suggest that a reaction product had penetrated the damaged but intact epithelium and remained as a deposit after healing had taken place. This may represent a deposition of titanium, but biopsy studies would be necessary to establish definitely its presence.

Nine additional cases of less severe burns were followed. These ranged from mild second-degree burns to a transitory erythema which disappeared within hours. In contrast with the three cases of severer burns, there was no scarring and no pigmentation appeared. These were associated with relatively dry skin and no application of water.

Removal from Body Surfaces

Since the application of water to skin surfaces in the presence of this chemical can be dangerous, other methods for removal were tried. Of these methods, dry wiping with towels and cotton waste proved most satisfactory in our experience. (In a recently published data sheet on titanium by the National Safety Council,[2] it was also advised that titanium tetrachloride spilled on the skin be wiped off with a dry cloth.) The wiping material was packed into sealed polyethylene bags for protection from moisture and placed in easily accessible locations about the plant. However, experience has shown that a residue of irritating material will remain after dry wiping. This should be removed by washing with cold water.

Effect on Skin in Absence of Water

Laboratory workers have long been accustomed to having the liquid in contact with their hands without suffering ill effects. A study of the hands of a number of such workers revealed only a tendency toward drying of the skin. To determine this effect more precisely, a controlled study was carried out on 10 volunteer subjects. For maximum sensitivity, the skin of the flexor surface of the forearm was selected.

The relative humidity of the laboratory area was 34%, and the temperature 77° F during the test period. After each subject's arm was wiped dry, 0.5 cc of purified anhydrous titanium tetrachloride was applied and left on skin for one minute. After removal with a dry towel, a tenacious light yellow to white granular deposit remained. The subjects reported the onset of a stinging sensation between 5 and 32 seconds after application of the chemical. This stinging sensation along with the deposit, disappeared, immediately after washing with cold water. No erythema, evidence of irritation, burn, or other visible change could be detected during the next 24 hours, and the subjects reported no discomfort.

Treatment of Burns

In general, the principles of treatment of a titanium tetrachloride burn are the same as those for a thermal burn. However, before any occlusive dressing is applied, it is very important to make sure that all of the corrosive agent has been removed. This deposit is very tenacious and may not be apparent to the eye. If any of the active material remains, a strong odor of hydrochloric acid will usually be apparent. The pH of the skin may be determined by applying moistened test tape, and if a strongly acid reaction is obtained further irrigation is indicated.

Once the corrosive agent has been removed, the usual treatment of a thermal burn may be instituted. An aerosol spray containing neomycin and cortisone is of value. Aseptic technique is most important because these burns are often deceptively deep, and care must be taken to avoid further loss of tissue due to infection. In third-degree burns, the rate of tissue regeneration is rather slow, but first and second-degree burns will usually heal rapidly.

Effect in the Eye

A splash of liquid titanium tetrachloride in an eye can lead to permanent damage. Even the fumes can cause serious injury. In an early physiology study, Foulger and Fleming[3] reported that when rats were exposed to a heavy concentration of fumes their corneal membranes were literally cooked white. Reisman[4] noted that in a fatal case of fume exposure the victim exhibited a severe conjunctivitis with extensive destruction of corneal tissues. Four other patients with severe fume damage hospitalized by Reisman evidenced similar corneal damage.

After a splash of liquid or contact with fumes, immediate emergency treatment is required. First, the eyelids and adjacent facial structures should be wiped thoroughly with a dry cloth or waste material to avoid adding a thermal burn to the already existing chemical burn. Then, large quantities of water should be used in irrigating the eyes. The attending physician should remove any particles of titanium dioxide or oxychloride with meticulous care and follow this with prolonged irrigation, using sterile isotonic saline solution. The use of a neutralizing agent, such as bicarbonate, should be avoided because of the danger of generating heat and the possibility that bubbles might become lodged between layers of injured corneal tissue. To minimize the danger of infection and reduce the corneal edema, instillation of drops containing neomycin and hydrocortisone would be helpful. Protection from light and careful observation will be necessary. If any degree of corneal damage is observed, early referral to an ophthalmologist is advisable.

II. Titanium Tetrachloride Fume

Acute Exposure

Effect on Lungs—In the earlier study reported by Foulger and Fleming,[3] rats exposed to heavy concentrations of the fumes developed either a moist lung or frank hemorrhagic pulmonary edema. In a later study, Foulger and Zapp[5] reported that dogs exposed to the fumes showed severe respiratory distress during and after exposure. It was their impression that the main effect of inhalation of the fumes was a severe bronchitis with pulmonary edema. In a fatal case of fume exposure studied by Reisman,[4] the patient was admitted to the hospital in a critical state and developed progressively increasing respiratory distress until he died four days later. X-ray studies during the hospital course revealed mottled densities in the upper half of each lung, extending out from the hilar areas. The patient's temperature rose to 104° F, with progressively increasing respiration and pulse rates. In another case, the patient was admitted in acute respiratory distress, which persisted for several days, accompanied by hyperpyrexia and x-ray evidence of a persistent pneumonitis. Intensive antibiotic therapy apparently had no effect in the initial stages. After several days the pneumonitis cleared, and the patient recovered completely during a 14-day hospitalization. In six additional less severe cases hospitalized by Reisman, the picture was that of a moist lung with obstructive wheezing of an asthmatic type. In these cases, no x-ray changes were noted and all cleared within one or two days on oxygen, sedative, and antibiotic therapy.

Clinical Laboratory Findings—The laboratory results reported for test animal and clinical cases are not specific. Foulger and Zapp[1] reported an upward trend in the platelet count of a dog following exposure to the fumes. In a general discussion of pulmonary edema, Fleming[6] states than an increased platelet count is characteristic of many types of fume exposure, possibly due to damage to alveolar capillaries or the general effect of asphyxia. In the study reported by Foulger and Zapp,[1] three out of four dogs exposed intermittently to moderately heavy fume concentrations showed an increase in the total leukocyte count. In the two patients with more serious fume exposure hospitalized by Reisman[4] the white cell count ranged from 14,450 to 27,400. In six cases of less severe exposure the white cell count was elevated in four and normal in two. In all of Reisman's cases, the differential count indicated a polymorphonuclear response.

Pathologic Findings—Foulger and Zapp[1] reported that the lungs of dogs exposed repeatedly to moderately heavy concentrations of the fumes contained multiple focal areas of inflammation. These contained numerous monocytes distended with brown granules and were scattered diffusely through the lung with groups about the bronchi. The brown granules in the monocytes were identified as titanium-containing compounds by histochemical staining reactions. There was evidence of connective tissue proliferation in the vicinity of the monocytes, and masses of destroyed cells occupied the centers of the largest lesions.

In the fatal human case studied by Reisman,[4] at autopsy both upper lobes of the lungs were congested and relatively airless. The bronchial mucosa appeared brownish and rough, but with no purulent exudate. On microscopic section, there was marked hyperplasia of the lung tissues, with swollen cuboidal epithelium and marked cellular hyperplasia of the alveolar walls. In the alveolar spaces there was a fine network of excreted fibrin and a large amount of protein-like fluid, containing polymorphonuclear leukocytes. The bronchial mucosa appeared fairly hyperplastic and somewhat like stratified epithelium, with occasional changes consistent with ulceration.

Comment—There is little doubt that the main effect of titanium tetrachloride fume on the lungs is corrosive. Quantities of free hydrochloric acid exist in the fume, and more would be liberated on contact between the unreacted chemical and the aqueous secretions of the bronchial mucosa. However, the physiologic

role of titanium as it occurs in the tetrachloride is not entirely clear. Both metallic titanium and titanium dioxide have been subjected to intensive study. In the later study reported by Foulger and Zapp[5] titanium dioxide and neutralized hydrolyzed titanium tetrachloride were injected intraperitoneally into guinea pigs. Both elicited a tissue response characteristic of an inert substance. Metallic titanium has already found some use in medicine and dentistry, and the recent report of the National Safety Council[2] indicates that the metal may be ingested or implanted in living tissues without eliciting a reaction of injury. But titanium as it occurs in the tetrachloride is chemically very active and its physiologic properties may be quite different from those of the stable dioxide or elemental form. In the light of our present knowledge, we cannot say definitely that all the pulmonary damage following fume exposure is due to the hydrochloric acid present. In addition to the unknown effect of titanium, the hydrolysis of titanium tetrachloride results in a whole series of oxides and oxychlorides. These occur as particulate aerosols or may be absorbed on particulate matter. In such form, the still chemically active agent may be carried down into the terminal bronchioles and alveolar spaces, where it can slowly liberate acid products over a period of several days, resulting in intense and persistent pulmonary irritation. This may serve to explain the prolonged course of the more serious cases observed.

Treatment of Acute Fume Exposure—The most important aspect of treatment is preventive. A safety program emphasizing the avoidance of inhalation of the fumes should be an integral part of any industrial operation involving the presence of this chemical. All workers who might be subjected to a sudden release of fumes should be required to wear an airline mask. In addition, those working in adjacent areas should carry escape respirators and be instructed to use them when leaving an area enveloped with fumes.

After their earlier study, Foulger and Zapp[1] advised that prophylactic oxygen be administered *immediately* to all workers exposed to the fumes. Over the past several years, this procedure has been carried out on hundreds of fume exposures due to titanium tetrachloride or chlorine. A study of the records indicates that many of these might have developed severe pulmonary edema, had they not been given this treatment immediately after exposure. The prophylactic oxygen treatment is quite simple and may be administered by nonmedical personnel. The patient is asked to lie down on a cot and is generally given the oxygen mask before any physical examination is attempted. *Any delay in administering the oxygen appears to increase the severity of the symptoms.* Usually the patient can administer the oxygen to himself and will often report complete relief within a few minutes. In a mild case, the patient should be given oxygen for 20 to 30 minutes. He should then remain under observation for at least an additional hour. If no further symptoms are evident, he can return to work but should be instructed to report back to the dispensary immediately if any symptoms of chest discomfort or cough or fatigue appear.

If the patient is brought to the plant hospital with obvious respiratory distress or if the symptoms progressively become worse, he should be placed on strict bed rest and a careful observation of the vital signs made. If at all possible, cyanosis should not be allowed to develop. Oxygen should be administered by intermittent positive pressure, set at 10 to 20 cm of water. If there is a strong bronchospastic element to the reaction, aminophylline may be effective, but it should be used cautiously in the presence of shock. Studies by Luisada[7, 8] have indicated that an aerosol of ethyl alcohol is of value in the treatment of pulmonary edema, but this writer's experience in a limited number of cases has been that it tends to aggravate the chemical bronchitis. In general, the use of oxygen, reassurance, warmth and bed rest will relieve any symptoms of apprehension or discomfort that may be present. A mild analgesic, such as one of the salicylates may be of value. Generally, the use of any barbiturate or narcotic that would tend to depress the respiratory center should be avoided, although Luisada's work[7, 8] indicates that some cases of frank pulmonary edema may be benefited by morphine therapy.

Chronic Exposure

Long-Term Effects of Inhaling Low-Level Concentrations—Very little information is available regarding the long-term effects of inhaling these fumes. As noted previously, tissue reaction studies indicate that stable compounds of titanium are physiologically inert. Furthermore, annual chest x-rays taken of workers intermittently exposed to low-level concentrations of the fumes have not shown any progressive changes or abnormal response that could be related to the irritant effect of the fumes.

In order to develop more basic data regarding this effect, 10 experienced employees were studied in detail. This group included all employees of the plant who had had four or more years' exposure to the fumes. None had ever

complained of recurrent cough, dyspnea, hemoptysis, or other respiratory symptoms. Annual physical examinations had failed to reveal any abnormality of the cardiorespiratory systems other than noted in the discussion to follow. The results of these studies are shown in the Table.

Comment—A study of the subjects weights did not reveal any significant changes. Two weighed less than the "ideal" for their height and age, but neither had shown any progressive weight loss during the period of exposure. The laboratory findings were within the range of normal except for a mild eosinophilia in three and a relative lymphocytosis in four. The lymphocytosis may be explained on the basis that the study was made during an epidemic of influenza, but the eosinophilia might possibly by significant of individual sensitivity to a pulmonary irritant. A larger series, with total eosinophil counts, would be necessary to clarify this point. All but one had adequate vital capacities. This man had a vital capacity 78% of normal. However, although of slight build, he evidenced no clinical or laboratory evidence no clinical or laboratory evidence of pulmonary disease and plays basketball regularly without dyspnea or other difficulty.

Chest x-ray films taken before exposure to the fumes were available for all subjects. These and serial annual chest roentgenograms were studied with special emphasis on the detection of any changes that might have occurred during the period of exposure. In all of the subjects except one, no change could be detected. In the remaining subject (E.C.), an abnormality was evident, which had appeared during the period of exposure to the fumes. It consisted of fibrotic and infiltrative changes at the left base with areas of shifting discoid atelectasis. The etiology of these areas of discoid atelectasis is open to some question. Although there was no history of acute pulmonary disability at the time the change occurred, there remains the possibility that it represents the residual of a severe infection or even fume exposure that occurred at that time. In any event, no progressive changes could be demonstrated in serial chest X-rays taken since it first appeared 10 years previously.

Although this series is small, within its limits it is possible to conclude that we do not have definite evidence of progressive or cumulative changes in the lungs of workers exposed intermittently to low-level concentrations of titanium tetrachloride fume. However, these and all others exposed to the fumes should have regular annual physical examinations, including a chest x-ray, estimation of the vital capacity and possibly a study of the circulating blood eosinophils. Any evidence of progressive change or persistent pulmonary symptoms should call for restricting their exposure.

Summary

Titanium tetrachloride is a highly corrosive chemical, and presents a special hazard in that it reacts violently with water to liberate heat and produce hydrochloric acid. Serious injuries have resulted when industrial workers were sprayed with water after being splashed with the chemical. It should be removed from the body by dry wiping before any washing with water is attempted. Burns resulting from

Selected Clinical Findings in a Group of Employees with Long Term Exposure to Low Level Concentrations of Titanium Tetrachloride Fume

Patient	Age, Yr.	Years Exposed	Height (in.)	Weight (lb.)	Blood Hemoglobin (gm)	White Blood Cell Count	Blood Differential Count						Vital Capacity		Preexisting Chest X-ray Abnormality	Evidence of progressive change Seen in Serial Chest X-Ray Films
							Band Forms	Polymorphonuclears	Lymphocytes	Monocytes	Basophils	Eosinophils	Liters	Percent of Normal		
E. C.	50	17	73	196	14.5	8,800		50	31	10	2	7	4.4	95	No	Possible*
J. M.	45	12	68	177	14.0	9,650		52	44	4			4.0	93	Yes	No
R. M.	41	12	75	237	14.5	9,300		44	48	6		2	5.2	109	Yes	No
D. S.	39	12	68	150	14.5	10,550		60	33	5		2	4.2	97	Yes	No
A. K.	41	8	71	199	13.0	6,250		49	41	7		3	4.3	95	No	No
G. S. H.	37	6	74	203	14.5	7,700	1	36	52	6		5	4.4	94	No	No
G. B. H.	35	6	68	173	14.5	5,550		48	42	8		2	4.2	97	No	No
W. H.	33	6	72	186	15.0	6,150		57	37	5		1	5.2	114	Yes	No
J. L.	31	4	69	144	14.5	5,700		59	29	4		8	4.6	103	No	No
J. S.	29	4	69	155	13.0	9,700		57	37	6			3.4	78	No	No

*See text above.

its action are deceptively deep and slow to heal. A splash of the liquid in an eye may lead to permanent damage to eye structures. Immediate wiping of the eyelids and adjacent facial structures with a dry cloth, followed by copious washing of the eye with water, is necessary to avoid severe injury.

The main effect of titanium tetrachloride fume on the lungs is a corrosive one, resulting in an intense chemical bronchitis or pneumonia. The prevention of fume exposures is most important, and all workers who may be subjected to a sudden release of fumes should wear an airline mask. Any one who has been subjected to a fume exposure should be given immediate prophylactic oxygen treatment to minimize the possibility of developing pulmonary edema. In a limited study of chemical workers who had had prolonged exposure to low-level concentrations of fume, no definite evidence of progressive pulmonary change or dysfunction could be detected.

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Completed applications, supporting letters of reference, and transcripts must reach the Oak Ridge Institute of Nuclear Studies not later than March 1, 1961, to insure consideration. Forms may be obtained from the Industrial Hygiene Fellowship Office, Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tenn. Appointments will be made on or about April, 1, 1961.

Periodic Health Examinations: A Long Term Study, 1949-1959

S. C. Franco, M.D., A. J. Gerl, M.D., and G. T. Murphy, M.D., New York, N. Y.

THE PERIODIC examination program was inaugurated at the Consolidated Edison Company in 1949, and this long-term study through 1959 allows a critical appraisal of its value in the detection and diagnosis of disease.

The periodic health examination of apparently normal persons has been considered a constructive approach to the prevention of degenerative disease and cancer. The limitations of such examinations in the diagnosis of latent heart disease and in the detection of incipient cancer are well recognized. New clinical tests, however, such as the "2-step" exercise electrocardiogram, have proved of some value in the identification of potential heart disease. More extensive routine use of such clinical procedures as proctoscopy has revealed an increased incidence of benign rectal polyps. We cannot, however, give an answer as to whether routine proctoscopy will lead to an earlier diagnosis of rectal cancer in the asymptomatic person.

A considerable percentage of persons do present themselves with specific medical complaints or with a knowledge of preexisting disease. The fact that these have also been benefited by periodic examination renders academic the question of "detection" versus "diagnosis" of disease. In fact, the discovery of entirely unrelated disease by periodic reexamination was noted in the years of follow-up in people with underlying organic disease in another system.

Personal health education has been found to be a most important result of the periodic examination. Prompt recognition by the patients of symptoms of developing heart disease or the early signs of cancer was noted in those who had regular health examinations. This was valuable not only for those persons whose medical examination had revealed some disease tendency, but especially for a certain number whose previous examinations were entirely normal.

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Administration

The periodic examination program was established within the framework of the Medical Department at Consolidated Edison as a typical outpatient unit in 1949. The intradepartmental location of the examining unit was basically related to the centralized operations of the Consolidated Edison Company in the metropolitan area of New York. We recognize that periodic examination programs can be administered as well in an outside facility.

Participation in the program was on a voluntary basis and was extended to salaried personnel on the monthly payroll. It included mainly men—and fewer than a dozen women—in the age group 40 to 65, ranging from assistant foremen and supervisors to plant superintendents, bureau heads, and managers of departments to the top executive group.

In the years 1949 to 1959, a total of 717 persons (Table I) availed themselves of the facilities offered. There has been a variability in the composition of the group due to normal age and disability retirement and death as well as new participants. Allowing for this, the over-all participation can be estimated at approximately 70% of those eligible. It is interesting to note that in the top executive group more than 90% underwent regular periodic health examination.

The periodic examinations are scheduled on an annual basis, and appointments are forwarded automatically on a regular plan. Our experience indicates that more than 80% of those undergoing initial examination returned for reexamination. An average of seven examinations was performed per person in this

Table I—Periodic Health Examinations, 1949-1959

Initial Age	Persons, No.*	Years Examinations				Persons, No.				Diagnosis					
		No.	Av.	No.	Av.	Without Defect	With Minor Defect	"Normal"	With Major Defect	Cardio-vasc.	Gastro-intest.	Metab.	Neuro-psych.	Misc.	Mult.
25-29	2	14	7.0	10	5.0	1	1	2	0						
30-34	5	6	1.2	6	1.2	2	1	3	2	1	0	0	0	1	0
35-39	19	111	5.8	106	5.6	8	4	12	7	3	1	0	0	3	0
40-44	74	639	8.6	616	8.3	23	19	42	32	9	10	11	1	6	5
45-49	174	1,462	8.4	1,402	8.1	50	36	86	88	37	23	28	6	23	29
50-54	219	1,548	7.1	1,540	7.0	48	26	74	145	71	34	28	15	39	42
55-59	148	779	5.4	781	5.3	22	23	45	103	63	24	16	7	32	39
60-64	73	235	3.2	238	3.3	18	11	29	44	26	11	4	7	12	16
65-69	3	3	1.0	3	1.0	0	3	3	0						
	717	4,817	6.7	4,702	6.6	172 (24.0%)	124 (17.3%)	296 (41.3%)	421 (58.7%)	210	103	87	36	116	131

*10 female.

study. Follow-up examination of those in whom pathological conditions were detected was also scheduled.

Because of the intradepartmental location of the examining unit, unscheduled revisits for acute complaints were common. Theoretically, this type of contact examination should not be considered part of the periodic examination. It is a product of the health education aspect of such a program, however, and is included in the over-all statistics. The role of the contact examination can be evaluated from a review of Table II and Table IV. It assisted in the clinical diagnosis of acute coronary cases, and it was also responsible for approximately 30% of the cancer diagnoses.

The results of the examinations were kept confidential and were transmitted only to the individual and his personal physician. When a situation developed in which the health of the individual might be of concern to management, he was advised to discuss the administrative problem with his immediate superior. There was no compulsion to have the examination performed in the medical department unit, and he was free to go to an outside facility or decide not to have any examination. It is interesting that the number participating in the examination program increased year by year from 35% in 1949 to 79% in 1959.

The Periodic Examination

The periodic examination comprised in all cases a careful medical history and physical examination, certain routine laboratory tests, and such additional x-ray and laboratory studies as in the opinion of the examiner were necessary. The history was detailed and taken in its entirety by the examining physician. Patient questionnaires were not used. It was found that the routine examination including history, physical examination, and health counselling could be accomplished in one session of approximately one hour if routine laboratory studies were accomplished beforehand, such as a blood count and urine analysis, an electrocardiogram, and a chest x-ray film. A particular effort was made to get blood cholesterol and uric acid determinations and a postprandial sugar in those over 50 years of age. Exercise electrocardiogram tests were usually done on an annual basis. Additional blood chemistry, gastric analysis, and stress tests were undertaken for those persons whose clinical examination revealed a deviation from normal or whose family history raised a question of metabolic disease or achlorhydria. Proctoscopy was ordinarily scheduled in a revisit interview. The procedure was accomplished routinely in one segment of the persons examined, but in the remainder it was done only for specific indications.

At the completion of the studies, the significance of the findings, even if normal, was discussed firsthand by the physician who had personally examined the patient. The cost for

Table II—Classification of Cases with Major Conditions Noted on Periodic Examinations

	Cases	*Patients*
Diagnosed by periodic examination	410	377
Asymptomatic	187	154
Symptomatic	223	190
(Combined, 33)		33
	410	377
Diagnosed by personal physician or previously known to person (also had conditions diagnosed by periodic examination, 7 cases)	51	44
	461	421

Type of Examination Resulting in Specific Diagnosis

Type	%
Original	40
Successive	50
Contact	10

Table III—Major Conditions Detected by Periodic Examination of 717 Persons, 1949-1959
**410 Cases - 517 Diagnoses*

I. Asymptomatic: 187 Cases—229 Diagnoses

Diseases	Number of Diagnoses	
Cardiovascular		107
1. Hypertension and arteriosclerosis	64	
2. Coronary artery disease (including 2 myocardial infarctions)	16	
3. Aortitis, arteriosclerotic	14	
4. Auricular fibrillation, bundle-branch block	6	
5. Rheumatic heart disease	4	
6. Arteriosclerosis obliterans	3	
Metabolic		40
1. Diabetes mellitus	30	
2. Hyperuricemia	6	
3. Hypercholesteremia and cardio-vascular disease	3	
4. Hyperpituitarism	1	
Tumors		21
1. Benign		
rectal polyp	10	
thyroid adenoma	4	
colon polyp	1	
substernal thyroid	1	
2. Malignant		
bronchiogenic cancer	2	
cancer of prostate	1	
cancer of urinary bladder	1	
cancer of rectum	1	
Gastrointestinal		19
1. Cirrhosis	12	
2. Duodenal ulcer	2	
3. Inguinal hernia	2	
4. Cholelithiasis	1	
5. Colitis	1	
6. Diverticulosis of colon, advanced	1	
Obesity (20% overweight)		17
Bronchopulmonary		10
1. Tuberculosis (active, 3)	5	
2. Emphysema	3	
3. Atelectasis	1	
4. Cystic disease	1	
Genitourinary		5
1. Nephritis, chronic	2	
2. Renal stone	1	
3. Pyelonephritis, chronic	1	
4. Prostatic obstruction, benign	1	
Musculoskeletal		4
1. Paget's disease	2	
2. Osteoarthritis	1	
3. Gout	1	
Neurological (Parkinson's disease)		2
Miscellaneous		4
Neurodermatitis 2, myeloid metaplasia 1, latent syphilis 1		

II. Symptomatic: 223 Cases—228 Diagnoses

Diseases	Number of Diagnoses	
Cardiovascular		95
1. Coronary artery disease	51	
a. Coronary sclerosis	27	
b. Myocardial infarction	21	
c. Angina pectoris	3	
2. Hypertension and arteriosclerosis	18	
3. Arteriosclerosis obliterans	11	
4. Rheumatic heart disease	5	
5. Miscellaneous—paroxymal tachycardia 4, aortitis, arterio-sclerotic 4, auricularfibrillation 1, acute phlebitis 1	10	
Gastrointestinal		68
1. Duodenal ulcer	35	
2. Gallbladder disease	9	
3. Inguinal hernia	7	
4. Colitis	3	
5. Gastric ulcer	3	
6. Cirrhosis	2	
7. Regional lleitis	2	
8. Miscellaneous—chronic gastritis, hiatus hernia, hemorrhoids, diverticula—(esophagus, stomach, colon)		
Tumors		21
1. Benign		
rectal polyp	5	
thyroid adenoma	2	
laryngeal polyp	1	
tumor of breast	1	
2. Malignant		
cancer of rectum	3	
cancer of larynx	2	
bronchiogenic cancer	2	
cancer of bladder	2	
cancer of prostate	1	
lymphosarcoma	1	
epithelioma skin	1	
Musculoskeletal		19
1. Gout	9	
2. Rheumatoid arthritis	3	
3. Osteoarthritis of spine	3	
4. Paget s disease, intervertebral disc	2	
5. Scleroderma	2	
Neuropsychiatric		18
1. Anxiety neurosis	9	
2. Psychoneurosis	7	
3. Psychosis	1	
4. Migraine	1	
Genitourinary		18
1. Prostatic obstruction, benign	7	
2. Renal stone	5	
3. Ureteral stone	2	
4. Acute prostatitis	2	
5. Hydronephrosis	2	
Bronchopulmonary		16
1. Emphysema	8	
2. Asthmatic bronchitis	3	
3. Chronic bronchitis	2	
4. Bronchiectasis	2	
5. Pneumothorax	1	
Metabolic		14
1. Diabetes mellitus	9	
2. Hyperthyroidism	2	
3. Hypothyroidism	2	
4. Porphyria	1	
Neurological		6
1. Cerebral thrombosis	4	
2. Multiple sclerosis	1	
3. Neuritis, peripheral	1	
Hematological		4
1. Chronic leukemia	3	
2. Acute leukemia	1	
Obesity with associated disease		5
Ophthalmologic		4
1. Macular degeneration	2	
2. Cataract	1	
3. Glaucoma	1	

*33 persons appear in both asymptomatic and symptomatic group.

Table IV—Ten Most Common Diseases Discovered by Periodic Examinations—Characteristics and Course of Cases

Disease	Symptoms			Examination				Course							
	Symptomatic	Asymptomatic	Total	Original	Succeeding	Contact	Total	Disability Retirement	Deceased	Progressive	Unchanged	Improved	Cured	Unclassified	Total
Hypertension and arteriosclerosis	64	18	82												
Essential hypertension	36	4	40	16	24	..	40	2	3	3	24	2	2	4	40
Hypertension with arteriosclerosis	26	11	37	18	18	1	37	6	5	11	11	2	..	2	37
Hypertensive heart disease	2	3	5	5	..	..	5	..	1	1	3	..	..	..	5
Coronary artery disease	16	51	67												
Coronary sclerosis	14	27	41	17	20	4	41	5	5	3	13	10	..	5	41
Myocardial infarction	2	21	23	5	8	10	23	3	2	2	1	14	1	..	23
Angina pectoris		3	3	1	1	1	3	1	1	..	..	1	..	..	3
Diabetes mellitus	30	9	39	15	24	..	39	2	4	3	12	12	1	5	39
Duodenal ulcer	2	35	37	17	14	6	37	1	1	..	5	20	9	1	37
Obesity (20% overweight)	17	5	22	14	8	..	22	..	2	..	10	9	..	1	22
Aortitis, arteriosclerotic	14	4	18	12	6	..	18	1	3	1	9	3	..	1	18
Malignant tumors	5	12	17	4	8	5	17	2	4	..	2	2	7	..	17
Rectal polyps, benign	10	5	15	4	10	1	15	..	..	..	4	..	10	1	15
Cirrhosis	12	2	14	7	7	..	14	..	1	1	9	1	..	2	14
Gout	1	9	10	4	3	3	10	2	..	..	2	6	..	..	10
Subtotal	171	150		139	151	31		25	32	25	105	82	30	22	
Total			321				321								321

the detailed periodic examination in this survey has averaged approximately $40 per case per year.

Results of the Periodic Examination

In more than half (59%) of the 717 persons undergoing periodic examination, conditions of major medical significance in themselves or as precursors of potentially serious disease were noted. As shown in Table I, 75% were in the age bracket 45 to 59 years at the onset of their examinations. There was no difference in relative health at comparable ages between top executives and those in lower-level positions. The "normal" group (41.2%) also included persons with minor defects of no clinical significance.

Of the 421 people with major diseases (Table II, approximately 10% knew of conditions which they wished to have checked, but a sizable number, 36%, were entirely asymptomatic. The details of the diseases detected by periodic examination are summarized in Table III. In contrast to our previous report,[1] cases from other sources are not included. Fig. 1 graphically pictures the major conditions are readily indicates that the cardiovascular system was most frequently involved.

The 10 most frequent disease categories are listed in Table IV. Hypertension and its complication of arteriosclerosis head the list. The majority of these were asymptomatic. The arteriosclerotic complications were often diagnosed at follow-up reexamination, attesting to the value of such a procedure.

Coronary artery disease was next in line, and, as would be expected, more than 75% of these cases were associated with clinical symptoms. A word of explanation in reference to the diagnosis of myocardial infarction: almost half of the 21 acute cases were diagnosed in the Medical Department when the employee presented himself with a direct medical complaint (contact examination). Sometimes the symptoms were atypical. The remainder were diagnosed

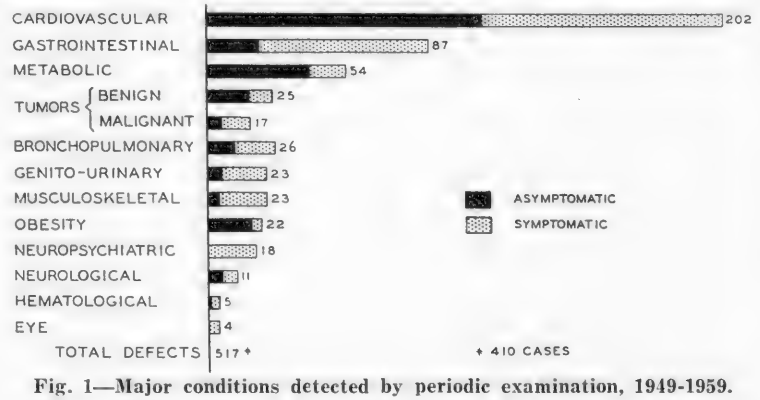

Fig. 1—Major conditions detected by periodic examination, 1949-1959.

in conjunction with the family physicians as a result of comparison of previous electrocardiograms and exercise electrocardiogram tests. Aside from this group, there were 11 cases diagnosed by outside sources.

Diabetes mellitus ranks third on the list. More than 75% were diagnosed in asymptomatic persons and most often as a result of glycosuria in a routine postprandial urine. Only once was the diagnosis uncovered by a routine postprandial blood sugar. In many of these cases, a sugar tolerance test was required to confirm the diagnosis because a fasting blood sugar was apt to be in the normal range.

In the diagnosis of duodenal ulcer, the clinical history was the most important factor. Gastrointestinal x-rays confirmed the diagnosis. It is interesting that only three gastric ulcers were revealed and long-term follow-up proved the benign nature of the lesion.

Obesity was not considered a major condition in itself unless the person was at least 20% overweight according to the method developed by Simonson and Keys.[2]

Malignant tumors were most often diagnosed with the onset of symptoms. It was surprising that two bronchogenic cancers were diagnosed by routine chest fluoroscopy in asymptomatic persons. It is interesting that carcinoma was most often diagnosed at periodic reexamination (47%) and contact examination (29%).

Rectal adenoma, usually as a solitary polyp, proved to be the most common tumor. There was only one case of multiple rectal polyps (four) which proved to be malignant. The majority of the rectal polyps were removed by local fulguration, as a hospital procedure by outside physicians.

The frequency of cirrhosis of the liver is in keeping with most morbidity statistics in an older age group. Gout proved to be the most common manifestation of joint disease. All of the cases in this study developed from a background of hyperuricemia which had been noted originally by routine serum uric acid determinations in asymptomatic persons.

There were four cases of myeloid leukemia, one of which was acute, and all were associated with clinical symptoms. Routine blood counts accomplished at prior annual examinations gave no clue to subsequent events.

Multiple diagnoses due to conditions developing in the followup years of the program were noted in 25%, and indicate one of the major problems to be faced in an older age group.

The original examination resulted in 40% of the specific diagnoses, and successive examinations accounted for 50%. The unscheduled contact-type examination for acute complaints was instrumental in identifying a definite disease process in 10%, such as acute myocardial infarction, acute abdomen, and malignant tumors.

It is difficult to state categorically the value of the various clinical procedures in establishing a diagnosis. It is obvious that in medical practice the composite approach must be used. For instance, postprandial glycosuria most often gave the first clue to diabetes mellitus. Sugar tolerance tests, however, were required to confirm the diagnosis. In line with our previous experience,[1] the history and the physical examination accounted for nearly 60% of the diagnoses, the electrocardiogram for 20%, and the laboratory tests, x-ray procedures, and special studies for the remainder.

Five percent of this group of 717 people died during the period of the study. This included cases followed beyond retirement, some for as long as seven to eight years. Normal age retirement occurred in 10%. Of those with major conditions discovered by a periodic examination, 9% were retired for disability, and in 7% the condition became progressive. Improvement was noted in 25%, and another 18% were considered cured. In 41%, the medical condition remained unchanged, but the persons involved were able to carry on their usual business activities. Table IV summarizes the course of the 10 most common diseases.

Early Detection of Disease

The challenge to the periodic health examination is to be found in the early detection of disease tendency, which antedates the presence of well-established illness with clinical symptoms. With this in mind, our endeavors were extended into three fields: (1) the "2-step" electrocardiogram exercise tests, (2) detection of hyperuricemia and hypercholesteremia, and (3) proctoscopy.

"2-Step" Exercise Electrocardiogram Test

The double standard "2-step" exercise electrocardiogram test, described by Master,[3] has been advocated as a safe type of stress test in the early detection of coronary artery disease. Briefly, this method uses "2-step" stairs, and there are tables, based on age and sex, for the standard number of ascents to be accomplished in three-minute periods. A control electrocardiogram is compared with tracings taken at intervals of one, two, and five minutes after exercise. The exercise electrocardiogram usually covers lead two and three precordial leads, V_3, V_4, and V_6. The double "2-step" test has been demonstrated to give a higher precentage of

Table V—Exercise-Electrocardiogram Test

Total number of cases tested		544
Negative tests (10% with cardiovascular disease)	408	
Positive tests (54% with cardiovascular disease)	136	(25%)
Single test		
Segmental depression	4	
Junctional depression	3	
Double test		
Segmental depression	53	
Junctional depression	47	
Borderline	29	
Follow-up		
Negative test—myocardial infarction	6	(1½%)
Positive tests—myocardial infarction	16	(11½%)
—myocardial damage	4	

Table VI—Hyperuricemia (Serum Uric Acid Above 6 mg%)

Cases out of 472 tested		90	(18%)
Original examination	29		
Successive examination	61		
Gout		10	(11%)
Associated diseases		54	
Cardiovascular disease (5 myocardial infarctions)	31		
Obesity	19		
Diabetes mellitus	3		
Cerebral vascular disease	1		

abnormal response than the single or standard test. It has also proved entirely safe and we have used it, although with proper caution, to confirm a history of angina pectoris.

Using the P-R interval as a control level, a definite depression of the S-T segment is said to be indicative of an abnormal response. Opinion differs as to the amount of depression of the S-T segment which is significant of an abnormal response. Our experience is in line with that of other investigators in that Master's criteria for abnormal response are too inclusive and would result in the overdiagnosis of coronary disease candidates. Our criteria for a positive exercise test are based on a depression of the R-ST junction of at least 1 mm in the limb leads, or more than 0.75 mm in the precordial leads, even if it is present in the one-minute tracing. Depressions lasting beyond one minute or deeper than 1 mm are of even more significance. Depressions of only 0.5 mm are considered a borderline test. The S-T junction depressions are said to be not as significant as the ischemic S-T segment depressions.[4] An analysis of our data[5] indicates that both junctional depressions and segment depressions were significantly associated with the development of myocardial infarction. However, junctional depression was the best predictor of myocardial infarction in a weighted combination of such variables as junction depression, segment depression, borderline depression, and other nonspecific cardiographic abnormalities. At times, a borderline test may be followed at a later date by a myocardial infarction; and, to truly confound the clinical picture, we have six cases of myocardial infarction in the group with a normal test.

The findings with the "2-step" exercise electrocardiogram test are summarized in Table V and indicate a 25% abnormal response (positive test) among 544 persons tested. In those with a negative test, cardiovascular disease such as hypertension, aortic arteriosclerosis, or arteriosclerosis obliterans was present in only 10%. In the positive test group, these conditions were present in 53%, including borderline abnormality of the electrocardiogram.

Only general findings will be summarized in this paper. In the positive test group, follow-up study revealed 16 cases of myocardial infarction (11.5%) and 4 instances of myocardial damage. These were rather evenly divided between the persons with and without other evidence of cardiovascular disease, such as hypertension. In the negative test group (normal), there were six instances in which myocardial infarction developed (1.5%). This type of false-negative test is one of the problems we encounter. In addition, a certain percentage of the borderline tests were found in persons with a great deal of nervous tension, and there was a tendency for the test to revert to normal on follow-up examination.

A critical appraisal of the "2-step" electrocardiogram exercise test indicates that it cannot be used for prognostication in the individual case. It does help to delineate a group in whom there appears to be an increased incidence of coronary artery disease. It has been our practice to use the abnormal electrocardiogram exercise test as a motivating factor in health counseling as regards weight reduction and elimination of excessive smoking. This becomes particularly important for those persons with a family history of degenerative disease or who themselves have diabetes mellitus or hypertension or who exhibit elevation of blood uric acid and cholesterol. It should be emphasized that these abnormalities are not necessarily diagnostic of coronary artery disease, and proper caution is to be observed in discussing such findings with lay persons.

Metabolic Study

The report of Gertler and his associates,[6] demonstrating the correlation of an abnormal

Table VII—Hypercholesteremia

Cases out of 523 tested (Original examination, 31; successive examination, 65)		96 (18%)
1. Blood cholesterol above 260 mg %	76	
2. Blood cholesterol above 300 mg %	20*	
a. Diseases associated with cholesterol more than 260 to 300 mg %		
†Cardiovascular disease (4 myocardial infarct)	25	
Obesity	2	
Diabetes mellitus	2	
b. Diseases associated with cholesterol more than 300 mg %		
†Cardiovascular disease (2 myocardial infarct)	8	
Obesity	2	
Diabetes mellitus	1	

*Seven cases (33%) returned to normal with diet.
†There were 23 cases of myocardial infarctions in this study (Table III).

serum uric acid in certain body types and an increased incidence of coronary artery disease, was of great interest to us. Ninety cases (18%) out of 472 tested during the course of the study revealed hyperuricemia with serum uric acid levels above 6 mg/100 cc (Table VI). There is a normal wide variation from 4.5 to 6 mg/100 cc, but with advancing age in this group the incidence of hyperuricemia increased from 7% at the seven-year review to 18% with the current review at eleven years. Cardiovascular disease was present in 31 cases and myocardial infarction developed in 5 persons, an incidence rate not materially different from that of the group as a whole. There was a relationship between overweight and hyperuricemia. In 10 cases (11%) clinical gout developed.

Table VII demonstrates that elevated blood cholesterol levels (above 260 mg/100 cc by Coleman method) were present in 96 cases (18%) out of 523 tested during the study. The criterion for hypercholesteremia was a blood cholesterol level over 300 mg/100 cc. Twenty cases (3.8%) fitted into this category. It should be noted that in seven cases the blood levels returned to normal with dietary care. As with elevated uric acid levels, the elevated blood cholesterol findings were more prevalent at successive annual examinations at an older age in persons who were originally in the normal range. There were also normally wide fluctuations. The incidence of cardiovascular disease and myocardial infarction was not materially different from the group as a whole.

A small percentage of persons tested had elevation of both blood cholesterol and uric acid levels, but it was too small a group to be meaningful. Since the significance of hyperuricemia and hypercholesteremia is not clearly defined, every attempt should be made to correct these metabolic defects because of reports of their possible correlation to an increased incidence of coronary artery disease.

Proctoscopy

A routine proctoscopy has been recommended in the physical examination of adult patients for the detection of malignant and premalignant lesions of the rectum and sigmoid. Proctoscopy was not done routinely in all our cases. One examiner performed it in 101 cases as a routine procedure and noted 10 benign rectal polyps, an incidence of 10%. There was also noted one rectal cancer which was subjected to successful abdominoperineal resection. A few of the polyps were detected on routine recheck of a previously normal proctoscopy after an interval of three to five years. Another examiner performed proctoscopy only as a result of specific complaints and in 59 such cases discovered four rectal polyps, an incidence of 6%. In the symptomatic group, however, were also found one sigmoid polyp and three cancers of the rectum. Abdominoperineal resection was accomplished in the cancer cases, but in only one was the five-year result successful. This case exhibited four small rectal polyps, each with malignant change. It is not possible to state whether the other two cases would have been detected earlier by routine proctoscopy in an asymptomatic phase. It is our feeling, nevertheless, that proctoscopy should be done as a routine procedure and it should be repeated at least once within a five-year period.

Most of the benign rectal polyps were removed by fulguration as a hospital procedure, but some have remained unchanged for as long as 10 years and without malignant transformation. The value of routine proctoscopic examination was not enhanced by routine colon x-ray study, and this procedure was discarded after the first five years of the study. Asymptomatic diverticula were noted in 20% of the cases irradiated, but no polyps or neoplasms were found by routine study.

Summary

A long-term study of a periodic examination program from 1949 to 1959 in a group of 717 persons indicates very tangible benefits in the diagnosis of medical conditions in an asymptomatic phase. Of the major conditions detected, 40% were discovered in the initial examination, 50% by reexamination, and 10% by contact examination for specific complaints.

Further proof of the value of the periodic examination is indicated by a number of condi-

tions which were corrected and improved by treatment. An intangible value of the procedure appears to be the development of a health consciousness so that these persons promptly sought medical advice when clinical symptoms occurred. This is particularly important in an older age group, since there is a likelihood of the development of multiple diseases.

The history and physical examination remain the basic tools of diagnosis in the periodic examination. The value of routine laboratory studies appears to be limited to the postprandial urine and, occasionally, a postprandial blood sugar. Routine blood counts did not assist in the early detection of leukemia. The possible value of serum uric acid and blood cholesterol determinations as predictors of degenerative disease continues to require study. Despite recognized limitations, the routine electrocardiogram has a definite value. Routine proctoscopy has been useful in the detection of asymptomatic rectal polyps. It is also recommended for the early detection of malignant lesions of the rectum and sigmoid. The "2-step" electrocardiogram exercise test may be helpful in the identification of persons who should be followed more closely for the development of coronary artery disease.

The extension of the periodic health examination program on a wider scale naturally raises questions as to its feasibility because of the limitation of medical facilities. Whether the early diagnosis of illness by prompt investigation of specific complaints will accomplish the same end-result as the periodic examination of apparently normal persons cannot be answered, but there can be no doubt as to the value of the periodic examination in the detection of asymptomatic disease. At the present level of clinical medicine, it is the most practical means for the prevention of disability.

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The Third Inter-American Conference

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This third Inter-American conference, unlike its predecessors, will be conducted in both English and Spanish. Previous conferences in 1956 and 1958 were conducted entirely in Spanish. Approximately 50 papers on various phases of occupational medicine and toxicology will be presented by distinguished representatives of more than a dozen countries. Further details may be obtained from Dr. William B. Deichmann, Professor and Chairman, Department of Pharmacology, University of Miami School of Medicine, Coral Gables, Florida.

Ceruminosis, a Factor in Audiometry

James Kawchak, M.D., Dearborn, Mich.

PRESERVATION of a high degree of auditory acuity has assumed increasing importance in industrial medicine. The medical department of the Ford Motor Company has been intensely interested in the broad aspects of hearing, and this study of ceruminosis was undertaken as representing only a small portion of this broad field. Undue exposure to high intensity noise of the kind found in heavy industry can result in loss of hearing, fatigue, and a general lessening of working efficiency. Although the hazards of exposure are not so great in "white collar" fields, where the general noise level is lower, maintenance of peak efficiency is just as important. One of the means of maintaining this peak efficiency among workers, whether in heavy industry or at desk jobs, is the assurance of full utilization of auditory acuity.

Modern audiometry provides a yardstick for hearing acuity and a means of identifying cases of hearing impairment which may have escaped either patient or physician. Hearing impairment may be caused by local pathologic conditions or by systemic diseases such as endocrine dysfunction, blood dyscrasias, malignant or benign growths, and drug idiosyncrasies.[1] One of the commonest causes of subclinical conduction deafness is ceruminosis, a condition which is all too commonly overlooked.[2] This report includes our experiences with this type of hearing impairment and its improvement by pharmacological ceruminolysis.

Audiometric Testing

For clinical purposes, physiological sound (sound heard by the patient) has two components, frequency of waves projected per second (pitch) and intensity level (loudness). The human ear responds to frequencies between 16 and 16000 cycles per second (cps.)[3]

Intensity level is determined by the amplitude of the waves and is measured in decibels (db). In terms of actual sound perception, a whisper at 5 feet is equivalent to 20 db, noise in an average office amounts to between 40 and 60 db, in a noisy office to between 60 and 80 db. A subway train or an elevated train produces 100 to 120 db.

The audiometer is designed to produce a graphic record of the patient's hearing acuity in terms of frequency and intensity. Test frequencies range from 125 to 8000 cps and are calibrated in octaves (the interval between any two sounds having a frequency ratio of 2:1). Acuity is tested in decibels at each frequency, the lowest intensity of each tone perceived by the patient being his threshold of hearing (Fig. 1).

In reviewing routine audiograms from a heterogeneous group of white-collar workers, we often found that some patients showed a definite disparity in audiometric readings at different times, a disparity not traceable to any permanent changes in bone or air conduction and not related to any pathological processes. Otoscopic examination usually re-

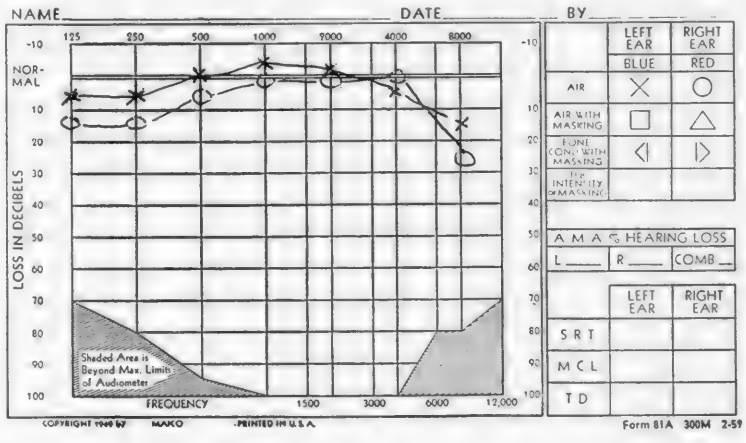

Figure 1

Dr. Kawchak is Physician-in-Charge, Medical Section, Central Staff Office, Ford Motor Company.

Submitted for publication Sept. 2, 1960.

vealed that the external canal of these patients was occluded with a heavy accumulation of cerumen.

To insure consistency of measurement, as well as to discover what role excessive cerumen plays in the impairment of auditory acuity, we decided to perform a series of audiometric measurements both before and after the removal of this impacted cerumen.

Method and Materials—Initially, an audiometric reading was taken to determine the degree of auditory acuity. The occluded ear was then cleaned of wax, and a second audiogram was recorded to discover whether ceruminolysis had improved auditory acuity. To avoid any trauma to the external canal or tympanic membrane, pharmacological ceruminolysis rather than instrumentation was used. In our search for a satisfactory ceruminolytic agent, we considered various factors, such as ease of application, effectiveness of action, and patient safety. Reports in the literature[4-11] indicated that a new ceruminolytic agent, an oleate polypeptide linkage in an aqueous miscible vehicle of propylene glycol,* fulfilled all of these requirements. The agent has a high dispersing and emulsifying index, yet lacks the aggressive tendencies of most detergents.[8] The polypeptide linkage provides a chelating substrate which preferentially attacks the protein composition of the cerumen, while the emulsifying action breaks down the fatty components.[8] The occluding cerumen becomes a disorganized mass, which, because of the aqueous miscibility of the vehicle, can be gently washed from the ear with either warm saline or water.

The technique of ceruminolysis consisted, first, of filling the ear with the agent and then placing a small cotton pledget, enveloped by rubber dental dam, in the meatus of the external canal to keep the material from running out. The ceruminolytic was kept in place for approximately one hour, during which time the patient usually returned to his job. At the end of this time, the ear was promptly irrigated with warm water. In our patients, we did not encounter contact dermatitis from the ceruminolytic. This has been reported, usually when it remained in the canal for several days and drained over the external ear from a cotton pledget not enveloped in rubber dental dam. Final audiometric readings after ceruminolysis determined the amount of hearing restored.

Patients—The patients chosen for this study were a selected group of 36, all with complete

*Cerumenex, The Purdue Frederick Company, New York 14, N. Y.

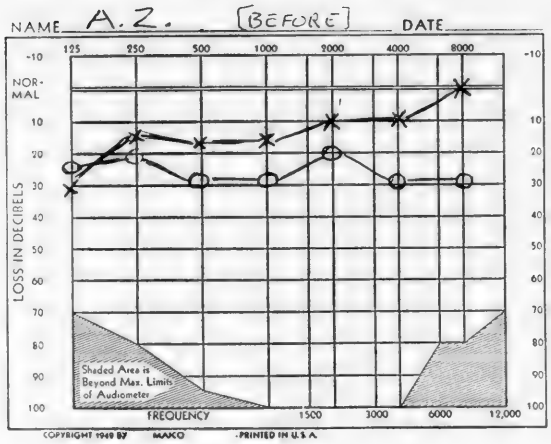
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Figure 2

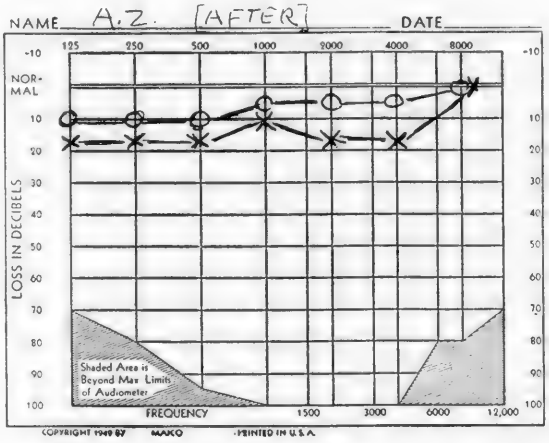
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Figure 3

ceruminous occlusion of the external auditory canal. Occlusion, in this study, was defined as obliteration of the lumen of the external auditory canal by a ceruminous plug, whether due to excess production of cerumen or to faulty elimination of accumulated cerumen. Excessive hair at the external meatus or anatomical deformities of the canal such as an unusual narrowing of the lumen or a sharp angle at the isthmus, whether due to surgical or to congenital factors, can cause accumulations of cerumen in any person, whether a "normal" or a "heavy waxer."[12, 13]

In the study, 31 of the 36 patients were symptomatic and 5 were asymptomatic. In 30 patients, there was a "blocked feeling" in either one or both ears. There were hearing impairment in 22 patients, autophony in 10 patients, pain in 2, pruritus in 2, and tinnitus in 1. In seven patients, there was an acute onset of symptoms after bathing and in four patients after swimming. Two first complained of symptoms after probing for wax in the ear with

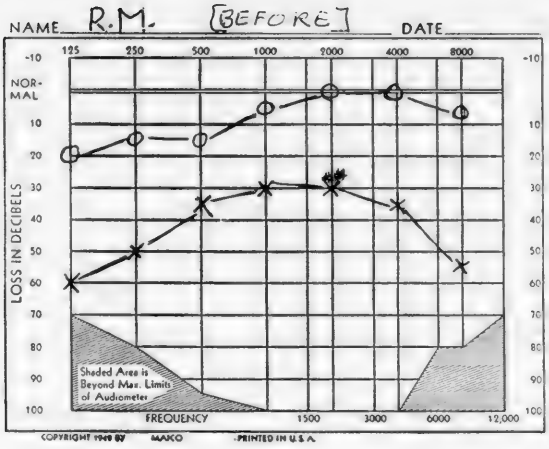
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Figure 4

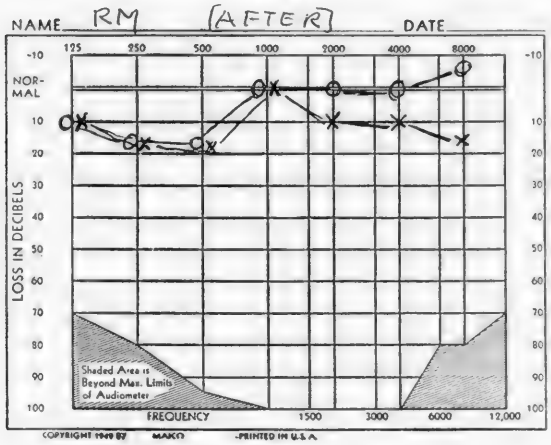
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Figure 5

their fingers and one after use of a hearing-aid insert. The five patients who presented themselves as asymptomatic showed complete blockage of the external auditory canals. Cerumen was removed prophylactically in these cases. Twenty-six patients had unilateral involvement, and ten had bilateral involvement. Of the total 46 ears treated and examined in 36 patients, the distal face of the ceruminous plug was located proximally in 7 ears, medially in 25 ears, and distally in 14 ears.

The following three case histories and the accompanying audiograms are representative of the complete group.

CASE 1—A 34-year-old female patient, a secretary in a large office, found it increasingly difficult to use the telephone at her right ear. There was a feeling of "blockage," and sound in general was muffled. These symptoms had been building up over a three-year period. Otoscopic examination revealed the right external auditory canal to be completely blocked with cerumen in the distal third of its length. An audiogram was taken (Fig. 2) and showed a loss of hearing of 20 to 30 db, in all frequencies, in the right ear. Cerumenex was instilled, the ear was plugged and one hour later irrigated with warm water. The patient expressed deep appreciation for the relief she felt upon irrigation. The "blocked feeling" was gone and she felt that she could "hear just as well in both ears now."

A second audigram (Fig. 3), taken after ceruminolysis, showed improved hearing in all frequencies.

CASE 2—The case of this 36-year-old man was unusual because he had a markedly narrow opening in the left external auditory canal due to a mastoidectomy. Although examination revealed that the left canal was occluded, the cerumen did not extend into the canal more than 3 mm. In spite of this small amount of cerumen, there was considerable hearing loss in the preceruminolysis audiogram (Fig. 4).

The patient, who had required regular irrigation for excessive wax since the age of 5, complained of "blockage" and impairment of hearing. Cerumenex was allowed to remain in the canal for 54 minutes. Irrigation brought quick relief, and an audiogram taken afterward showed a dramatic increase in hearing in all frequencies tested (Fig. 5).

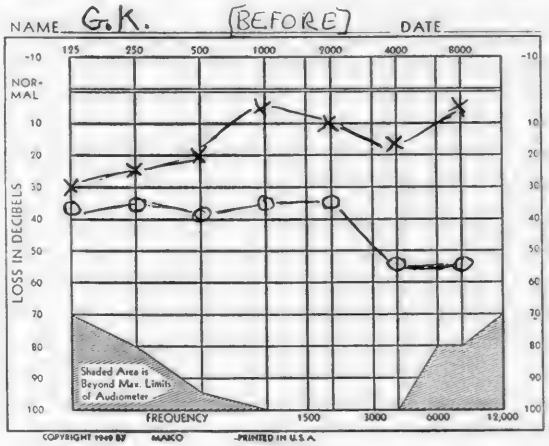
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Figure 6

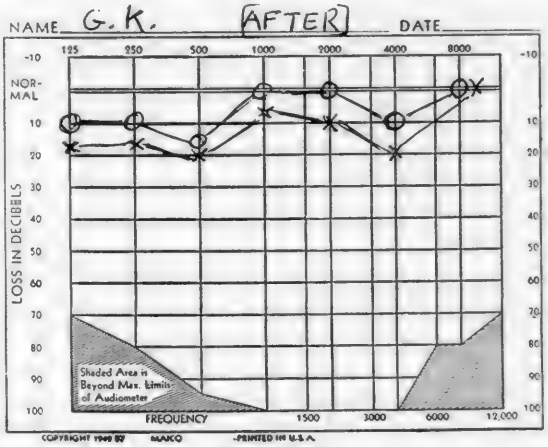
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Figure 7

CASE 3—This 39-year-old male patient had a narrowing of the external auditory canal, like the preceding, but in this case the narrowing was congenital. There was complete occlusion of the right canal in the medial third.

The patient had required irrigation for accumulated wax since the age of 19. The present symptoms of "blockage," impaired hearing, and autophony started a week prior to treatment. A possible inciting factor was showering.

An audiogram (Fig. 6) showed considerable loss of auditory acuity in all frequencies in the right ear. Instillation of Cerumenex for one hour and subsequent irrigation provided prompt relief.

Otoscopic examination showed the canal of the right ear to be inflamed where the cerumen had been adherent to the skin. An audiogram after ceruminolysis (Fig. 7) showed improvement in all frequencies.

Results

Of the 31 symptomatic patients, 26 were relieved of symptoms completely immediately after removal of cerumen. The remaining five complained of pain, and all had an underlying otitis externa; however, this group also became symptom-free after treatment of the otitis externa. It is interesting that three of the five complained of pain only after the cerumen had been removed.

Of the 46 ears irrigated, 11 and 9 had varying degrees of inflammation of the canal and tympanic membrane, respectively, where the cerumen had been adherent. One ear had inflammation of both canal and tympanic membrane. The canal inflammation was severe enough in seven to warrant specific treatment. Those with inflammation of the tympanic membrane required no treatment, and none was symptomatic following irrigation.

In the majority of patients, the Cerumenex was left in the canal for approximately one hour, and the time required for irrigation was five minutes or less for 34 of the 46 ears irrigated.

In none of the 36 patients was there evidence of any untoward reaction from the ceruminolytic agent used.

Instrumentation was not used in any of the 36 patients.

Of the 22 patients who complained of hearing impairment, 18 had definite objective evidence of improvement by audiogram, and the remaining 4 were relieved of symptoms despite little change by audiogram.

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Systemic Toxicity from Exposure to Epoxy Resins, Hardeners, and Styrene

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MANY ARTICLES have described the frequent occurrence of eczema in workers exposed to epoxy resins and polyamine hardeners, but little has been published regarding the occurrence of general toxic effects from these compounds. Boas-Franke, Dresel, and Dryden (1948), Dernehl (1951), and Pletscher, Schüppli, and Reifert (1954) mentioned asthma-like symptoms, but others found no such symptoms, even after prolonged exposure. Pletscher and his co-workers suggested the possibility of disturbances in liver function as general symptoms of fatigue, headache, and dizziness occurred, but Breil and Kröpfli (1956), who examined the same group of workers one year later, did not find any clear evidence of abnormality in liver function. The difference in these results may have been due to different intensities and lengths of exposure. The possibility of general toxicity cannot be excluded. Few papers dealing with industrial experience of the toxicity of styrene have been published. Baader (1954) described a lymphoblastic sarcoma in a worker who was exposed to styrene under bad ventilation. Others deny a causal relationship between hemopoietic disturbances and exposure to styrene. Rogers (1955) described a "styrene sickness," mainly drowsiness, which occurred after exposure to 200-700 ppm.

We examined 50 workers, the population of two departments of an aircraft factory between November 1956 and May 1958. Most of these men were exposed to polyamines (Härter 951, Ciba), a number of them also to styrene. Twenty-one were observed in a follow-up study from 6 to 18 months. The aim of this investigation was to examine the possibility of general intoxication as a result of inhalation of polyamines or styrene and, in some cases, of these two substances together. A study of occupational skin diseases in the same factory was published by Malten (1956).

From the Department of Occupational Medicine (Head, Dr. F. H. Bonjer), Netherlands Institute for Preventive Medicine.

Submitted for publication July 23, 1960.

Exposure

Department A—The manufacturing process in this department consists of the impregnation of inner surfaces of hollow objects with a mixture of "Araldit-Harz 103" or "D" (epoxy resins, Ciba) and "Härter 951" (polyamine mixture, mainly triethylenetetramine). A number of the objects are open only at one end. The inner surface comprises 1.4 to 1.5 sq. meter, an area which must be impregnated by hand brushing with 1,000 to 1,200 gm of the mixture.

The mixture consists of 10 parts resin to 1 part curing agent. As the resin itself (uncured) is practically nonvolatile, the main volatile substance in this department is the curing agent. This hardener may also contain some other substances or contaminants, such as other polyamines, allyl glycidyl ether, cresyl glycidyl ether, cyclohexanol, decalin, and glycols, all of them in small amounts. For cleaning purposes small amounts of solvents, mainly acetone, are used.

On the average the work crew comprises about 20 men, of whom 5 are occupied with impregnating and therefore exposed to peak concentrations of the polyamines. The other workmen are occupied with molding, grinding, assembling, transporting, checking. The air concentrations were not determined. Every month about 400-600 kg resin and 40-60 kg curing agent are used, i.e., 1.8-2.8 kg curing agent per man per month for the average workmen but 9-15 kg per man per month for the impregnators.

The department is about 3,240 cu. meter in size; the atmosphere is changed 12 times per hour by general and local artificial ventilation.

As Department A had just been started, the workmen could be studied from the beginning of their exposure.

Department B—The procedures consist mainly of the manufacture of small objects from polyester glass fiber material (airplane parts). The volatile products are styrene, mixed with cobalt naphthenate, dioctylphthalate and petroleum naphtha; styrene, mixed with Lamellon resin (polyester, styrene content 30%); and methylethylketonhydroperoxide (MEKP) dissolved in dimethylphthalate.

On the average the work crew numbers 45, and 3.5-5 kg styrene per man per month and 0.3-0.5 kg MEKP per man per month are processed.

In addition to this, two or three workers in this department undertake gluing with a mixture of "Araldit-Härter 951"; 3-7 kg curing agent per man per month are used, equivalent to 0.2-0.4 kg per man per month for the whole work crew. Two workmen are exposed to unknown solvents from Tensolcement or "Lösung II and III," used as curing agents for Plexigum 8051 (polymethylmethacrylate).

The department is about 4,230 cu. meters in size; the atmosphere is changed five times per hour.

Procedure

Fifty persons were examined. Group A consisted of 12 workmen from Department A, examined two to four times at intervals of six months; Group B of 9 workmen from Department B, examined two to four times at intervals of six months. Group C was comprised of 6 workmen (Subgroup C_1), 6 workmen (Subgroup C_2), and 17 workmen (Subgroup C_3), examined only once, within the first to fourth, the fifth to eighth, and after the eighth week of employment respectively. Of both Subgroups C_1 and C_2, five persons worked in Department A and one in Department B, while Subgroup C_3 was mixed (most of them from Department B, some from Department A, and some technical staff members).

The examination comprised an anamnesis, physical examination and laboratory investigation of blood and urine. The examination of blood comprised determination of hemoglobin, blood sedimentation rate, leucocyte count, differential white cell count, bilirubin in serum, thymol turbidity, electrophoretic protein pattern; only once the enzyme activity of serum was determined: serum glutamic oxalacetic transaminase, serum glutamic pyruvic transaminase, aldolase, and lactic dehydrogenase. The urine was examined for albumin, urobilin, and coproporphyrin. The blood was taken and the urine was voided at about 9 a.m. with the stomach empty.

Results

Group A—The follow-up of these 12 workmen who were exposed for at least 6 months, and in most cases for 13 to 18 months, yielded the following results: There was a significant decrease ($P < 0.02$) in the relative percentage of lymphocytes and a corresponding increase in neutrophils: the total leucocyte count remained the same. The relative lymphopenia occurred after about one year of exposure (Friedman's test, $P = 0.05$, $n = 8$, $k = 3$). There was no relation between the occurrence of relative lymphopenia and of eczema. The other laboratory investigations did not yield any significant results; the hemoglobin showed a nonsignificant decrease. The subjective symptoms, which occurred in only five workmen, included "drowsiness" with decreased appetite, headache, gastric pains, fatigue, and weakness which was related to exposure. There were few complaints of eye irritation and no work-related asthmatic or bronchial symptoms. Physical examination showed no abnormality except a slight tremor in some subjects. Seven workmen developed an eczema.

Group B—The follow-up of these nine workmen, who had been exposed for at least 15 months, and in most cases for about 2 years, yielded the following results: There was a significant decrease in γ-globulin ($P < 0.02$) and an increase in slightly and definitely positive urobilin reactions. The decrease in γ-globulin became evident at the third examination (Friedman's test, $P = 0.08$, $n = 7$, $k = 3$), and was accompanied by a nonsignificant increase of α_2-globulin (t=test, $0.05 < P < 0.10$). The increase in positive urobilin reactions was significant only if a trace was given the same weight as a clearly positive reaction (Cochran's test, $P < 0.05$, $n = 7$, $k = 3$).

Subjective symptoms occurred in only five persons, and consisted of a moderate degree of drowsiness, related to exposure. Physical examination did not reveal any definite abnormality; one man had a palpable liver, and several had a slight tremor. Two workmen developed an eczema.

Group C—The examination of this group, undertaken once only, yielded the following results: There was no significant difference in laboratory tests between subgroups C_1, C_2, and C_3 (test of Kruskall-Wallis, $P > 0.30$); subgroups C_1 and C_2 could therefore be combined into subgroup C_{1+2}, exposed for eight weeks or less.

There was no significant difference between the laboratory results of subgroup C_{1+2}, and of the first examination of group A or of group

B (group A had been exposed for less than 8 weeks at the time of the first examination), although group A and group B both showed a somewhat higher albumin and lower γ-globulin percentage of serum protein. This suggestive, but not significant, difference in protein pattern may be examined in relation to two hypotheses.

Hypotheses

Hypothesis 1—There is a variation in serum protein determinations made on different days, which may be of importance because the subjects from group A, B, and C were not randomly spread over the days of examination. This hypothesis could not be tested because the numbers of workmen examined per day were too small for reliable analysis.

Hypothesis 2—Group C_{1+2} contains people "different" from those groups A and B. Comparing the clinical data of group C_{1+2} (12 men, first and only examination) and of group A+B (21 men, first examination), there proved to be a striking difference.

In group C_{1+2}, 11 men had symptoms (drowsiness or cough) or signs (bronchitis, tender epigastrium, or eczema), whereas in group A+B only 9 men could be classified as "unfit" against 12 men as "fit." This difference is significant: $\chi^2 = 9.702$, $P < 0.01$. The serum protein values correlated with "fitness": there were higher albumin and lower β- and γ-globulin in "fit" men than in the "unfit." Within group A +B the correlation was significant for albumin ($P < 0.001$), γ-globulin ($P < 0.03$) and β-globulin ($P < 0.05$).

There proved to be good agreement between the data for group A + B "unfit" and for group C_{1+2}, whereas the data for group A + B "fit" compared very well with the normal values given by the University of Leyden (based upon 20 healthy adult males and females) and the normal values established by De Jong (1955) determined by the same method (See Table). The hypothesis that group C_{1+2} consisted of "different" people seems to be justified. This is confirmed by other data: From group C_{1+2}, 9 out of 12 men developed an eczema generally necessitating transfer, whereas in group A + B, 9 out of 21 men developed eczema after longer exposure, and not so severely as to necessitate transfer to other work.

Discussion

Care must be used in drawing conclusions for the following reasons. (1) An adequate control group was not available. (2) The diagnosis of "drowsiness" was based upon subjective symptoms. (3) It is possible that with larger groups or with longer exposure some differences might have been significant, e.g. decrease in hemoglobin in group A. (4) Absence of disturbance in the functions examined does not imply absence of disturbances in functions examined partially or not at all. (5) The workmen were exposed to mixtures of organic substances (in Department A exposure was mainly to triethylenetetramine; in Department B to styrene also).

Values for Albumin and γ-Globulin Percentages in Groups A + B and C_{1+2} in relation to normal values and "fitness."

Protein Pattern			Group A+B "Fit"	University of Leyden	De Jong (1955)	A+B "Unfit"	C_{1+2}
Albumin	%	$\bar{x}$	70.31	69.8	69.8	66.95	66.34
		s	3.09	1.5	1.5	3.47	2.18
γ—Globulin	%	$\bar{x}$	12.22	12.9	12.9	14.63	14.67
		s	1.20	1.3	1.3	2.53	1.38

Although determinations of air concentrations are not available, comparison of the quantities of chemicals used with those previously recorded shows that in Department A the exposure was heavier than in most industries in which epoxy resins are processed. Grandjean (1955) published a survey of skin diseases caused by epoxy resins in 11 industries, mainly producing condensors; the average of curing agent used per man per month varied from 0.2 to 3.2 kg. The average use of 1.8 - 2.8 kg curing agent per man per month in Department A therefore corresponds with the higher range of the factories reported by Gandjean. Moreover, in Department A the surfaces of the impregnated objects were much larger (1.4 - 1.5 sq. meter). In most electrotechnical factories, therefore, air pollution by polyamines would be expected to be much smaller than in the investigated Department A. The exposure in Department B is more difficult to evaluate. Exposure to styrene was not great at 3.5 - 5 kg per man per month; this does not indicate a serious amount of air contamination. Furthermore, the workmen of group B were mainly occupied in laminating relatively small objects.

Physical examination of men in group A did not yield any evident abnormalities; subjectively there was nondisabling drowsiness, related to exposure. There was no complaint of asthmatic or bronchitic conditions related to work. Irritation of the conjunctiva and other mucosae was present, but not disabling. Haloformation (Bourne, Milner, and Alberman, 1959) was not spontaneously mentioned. The only significant result in group A was a relative lymphopenia after about one year of exposure.

This was not related to eczema, drowsiness, or high exposure. There is no convincing evidence of systemic toxicity.

From the follow-up study of group A, exposed mainly to triethylenetetramine, it is concluded that, although complaints of nondisabling drowsiness were made, no clear evidence for general intoxication could be established. In this industrial situation there is a relatively high exposure and an exposure time up to 18 months. It is therefore concluded that the hazard of general intoxication by inhalation of triethylenetetramine and homologues used in many electrotechnical industries in which, for example, condensors are processed, is negligible.

The high incidence of allergic skin diseases was confirmed; 60% of all the workers in Department A had these conditions. The workmen concerned had not been exposed to polyamines prior to the investigated period.

The investigation of group B, mainly exposed to styrene and triethylenetetramine, yielded results similar to those in group A. Physical examination did not reveal any definite abnormality; complaints of drowsiness were made by five subjects. The decrease in γ-globulin is significant, but of about the same order of magnitude as a non-signfiicant decrease in group A. This fact, together with the great variability in γ-globulin values and the small absolute decrease in these values, does not provide evidence of general toxicity. The increase in positive urobilin tests was significant only if a trace and a clearly positive reaction were weighted equally. This is not sufficient evidence to show that disturbance of liver function had taken place. Other liver function tests were negative.

From the follow-up study of nine workmen exposed to styrene and triethylenetetramine, it is concluded that, although complaints of nondisabling drowsiness were made, no clear evidence of general toxicity could be established. Further laboratory and field studies will be undertaken to study psychophysiological responses to exposure to styrene and other volatile components used in manufacturing and processing plastics.

In this investigation we had planned to study all the subjects for 18 months. During the period of observation, however, 29 persons dropped out of the study: subgroup C_3 ($n = 17$) consisted of a mixed population (Department A, Department B, technical staff) who dropped out for many different reasons. Subgroup C_{1+2} ($n = 12$) was a more or less homogeneous group, mainly ($n = 10$) from Department A and all exposed for eight weeks or less. Subjects from this subgroup dropped out of the study mainly because of transfers to other departments: Nine had to leave because of disabling eczema before the second examination took place, six months later, in contrast to the occurrence of six cases of eczema in group A and two in group B, most of which developed after a longer exposure and were less disabling.

Subgroup C_{1+2} clearly appeared to be a selected, biased group, consisting of "unfit" people, compared with the subgroup A and B. Remarkably enough, this was reflected in the serum protein pattern. The "unfit" groups had an average lower albumin and higher β- and γ-globulin percentage than the "fit" group. The variability in protein pattern, however, is too great to use as a criterion in the preemployment examination of individuals. The suggested relationship between serum protein pattern and resistance to allergic eczema is not proof of a causal relationship. This unexpected observation, however, is intriguing and important enough to deserve further study.

Summary

An investigation was undertaken of 50 workmen, 21 of whom were observed for 6 to 18 months and all of whom were exposed to triethylenetetramine or styrene and in some cases to both of these substances. Clear evidence of general toxicity could not be established, although complaints of nondisabling drowsiness were made. Owing to the absence of disturbance of liver and lung function in an industrial situation with a relatively high exposure to triethylenetetramine, the hazard, if any, seems to be negligible in the electrotechnical industries. The occurrence of allergic skin conditions and not the risk of general toxicity proved to be the main health problem. Moreover, the data suggested a predisposition to allergic eczema in cases with a deviating protein pattern.

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INDUSTRIAL TRAUMA

IV. Principles of Management of Ocular Injuries

Roderick Macdonald Jr., M.D., Louisville, Ky.

PREVENTION of the unnecessary loss of years of useful vision due to accidental injuries has been the aim of modern industry for many years. As a result of careful planning, worker education, screening programs, protective lenses and the like, great strides have been made in this direction.

However, trauma is ever with us, and hence it is most essential that industrial physicians become well acquainted with the general principles involved in the management of ocular trauma and for ophthalmologists to understand well the many eye hazards workers may encounter in their daily performances of their jobs.

In this paper it is my purpose to discuss several different types of more common industrial ocular trauma, to comment upon them from the point of view of immediate diagnosis and care and more prolonged management, and finally to consider briefly what might be in order in the later care of such a case.

History of Injury

As with any patient and with any branch of medicine, an adequate history of the traumatic episode is essential to the clear understanding of the case and recognition of the proper steps that should next be taken. An accurate history of a chemical splash injury would preclude the taking of extensive x-ray films of the orbit, whereas the history of a sharp, stinging sensation in the eye while working on a lathe or other metal grinding instrument would immediately suggest the possibility of a small, very sharp metallic particle having entered the globe and lodged in the anterior chamber, iris, lens or further back in the eye, depending upon the force of impact and the position of the eye at the time of injury. In this latter situation, x-ray studies are extremely important, as the patient will usually need to have surgery in order to remove the foreign body.

Perforating Wounds

Localizing x-ray studies utilizing the Sweets[1] technique or others, and "bone-free" films of the eye, as advocated by Vogt,[2] may be of great benefit. Foreign bodies in the anterior segment of the globe generally carry a better prognosis than those in the posterior segment, due to easier removal with a magnet or instrument in the case of nonmetallic foreign bodies. The intraocular structures are usually damaged more severely in the removal of posterior foreign bodies. In this connection, it might be well to point out that foreign bodies have been known to penetrate the globe and continue on into the cranial cavity. It is well to remember this possibility, so that what might be considered an eye case only, is in reality a complicated neurosurgical problem. Appropriate measures must then be carried out. Foreign bodies deep in the orbital cavity, but not into the intracranial area are best left alone, unless causing symptoms.

Chemical Injuries

Perhaps the commonest of all forms of industrial eye injuries are chemical splash injuries. The number of chemicals to which workers may be so exposed is large. In general, chemical injuries are divided into acid or basic types depending on pH. Initially, both types appear similar clinically. There is copious tearing, photophobia, chemosis, redness of the conjunctiva, and corneal changes. The lids may also be edematous and swollen shut, if several hours have elapsed from the time of injury to the time of initial examination and treatment.

Following a drop or two of an ophthalmic local anesthetic solution, an attempt should be made to determine the patient's visual acuity, so that a base line is established. Copious irrigation, using sterile saline, should be carried out

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for 15 to 20 minutes. The lids must be everted in order to remove any particulate matter which might continue to release damaging chemical into the tissues. Burns may extend deeply into the cornea, conjunctiva or sclera if this precaution is not observed.

Cycloplegic drops such as 1% atropine should be used to dilate the pupil, so as to reduce the iris vasomotor reaction and relieve photophobia. Early use of corticosteroid preparations is of great value in reducing the inflammatory response and decreasing the amount of permanent scarring. If the eye appears infected, prompt cultures taken with a platinum loop from the mucous membranes surface of the eye, usually the lower cul-de-sac, should be made on blood agar and in thioglycollate broth. Proper antibacterial or antibiotic therapy can then be started, based on adequate sensitivity studies. "Shotgun" antibiotic therapy is to be condemned.

In cases of chemical injury occurring on the medial side of the eye involving the lacrimal drainage system, care must be taken to prevent strictures in the puncta or canaliculi, resulting in deficient drainage of the tear fluid and epiphora. During the acute stage repeated probings, dilations and/or the use of polyethylene tubing through the lacrimal passages may be indicated. Alterations in lid position due to scarring are best corrected by definitive plastic procedures after the inflammatory process is well subsided. Where the cornea remains in a chronically edematous state with repeated epithelial breakdown, tarsorrhaphy may be of benefit and the lids should not be reopened for several months.

Severe chemical injuries are always, I believe, best treated in the hospital ultimately. However, we must remember that immediate lavage of the eyes within seconds after a chemical injury is most important. Some type of irrigating device, whether it be a shower, basin with running tap water or other apparatus, should always be immediately available in areas where dangerous chemicals are handled. Many times the injured worker's co-workers can do more to save a chemically burned globe by use of the above devices than the physician who may see the patient in 10 to 15 minutes or later following such an injury. Concentrated ammonia, for example, can penetrate the corneal structures and enter the anterior chamber in six to eight seconds after exposure.

Following such therapy, the patient is then ready for admission to the hospital, where care is constantly available and can be carried out by aseptic techniques where necessary. Complications such as perforations of the globe, or secondary glaucoma may be immediately treated and much lost time saved between recognition of onset and institution of therapy. Ocular infections which may develop and require bacteriological studies are better handled where such facilities are available.

Lacerations of the Globe

There are several very important considerations to be remembered in caring for lacerations of the globe. One of the most important is that no detailed examination of the eye should be attempted until the patient is given medication for pain and is in an area where adequate inspection can be carried out. Until then, the patient should be transported by stretcher with both eyes patched. Akinesia, ultilizing either the O'Brien[3] or Van Lint[4] technique, should be done before an attempt to open the lids is made. Efforts to open the lids forcibly will result only in squeezing and extrusion of the intraocular contents. Cases where these principles have been violated have resulted in lost eyes.

Every lacerated globe, unless almost totally destroyed, should be repaired and every effort made to save it. We have seen many cases of lacerated eyes for which there appeared to be no hope, carefully repaired and ending with a fairly good visual result. If, on the other hand, the general anesthetic would endanger the patient's life, an attempt at repair under local anesthesia can be done, but is very difficult and the chances are lessened for a good result. If the patient develops life-endangering complications on the operating table, the repair is best stopped. One should always keep in mind the possibility of sympathetic ophthalmia in these cases of lacerated globe, especially if the injury involves the ciliary body region. Tetanus antitoxin or toxoid, gas-gangrene antitoxin, antibiotics, and other supportive measures should be used when indicated; in such cases the visual prognosis is guarded. Cataract formation and retinal detachment secondary to glial scarring or cyclitic membrane contracture are later changes that may also contribute to the loss of sight.

Lid Lacerations

Lacerating injuries of the eyelids are important. Because of structural changes produced by such injuries, the patient may develop exposure keratitis where the upper or lower lid is avulsed from its normal position; altered lacrimal outflow and epiphora where the puncta and canaliculi are severed; and ptosis when failure to recognize a damaged levator muscle has

occurred. It is important to explore most carefully all lacerations of the lids for the above reasons and also because sharp objects may penetrate the lids and cut into the globe itself or sever an extraocular muscle with the result that the patient developes strabismus. Suturing of the lacerations is not too difficult, but failure to recognize the above principles may result in a poor functional result or even in a lost globe and blindness.

Orbital Fracture

Severe contusions about the head and face require x-ray studies to uncover fractures which may be present. A sometimes overlooked fracture is the so-called "blow-out" fracture of the floor of the orbit. Usually the patient has severe swelling about the injuried area so that alterations in the normal anatomic positions are not noticeable immediately. However, after 5 to 10 days, when the acute reaction is over, the patient will begin to complain of diplopia; the eye on the affected side will appear to be lower than its fellow; the lids will have lost some of their fullness; and there may be an apparent enophthalmos. Prompt recognition of the possibility of a blow-out fracture from an adequate history and also from x-ray studies will lead to an immediate reduction of the fracture by surgical elevation of the orbital floor ending in a good result. Failure to do so may necessitate an extensive plastic repair at a later date with a much poorer prognosis for a good functional result. "Blow-out" fractures are sometimes hard to demonstrate with conventional views and may require the use of special laminography techniques. Fractures occurring on the medial side of the orbit may produce dacryostenosis by direct injury to the lacrimal sac. These should be repaired carefully so as to obviate the necessity for further surgery at a later date.

Contusions

Contusion injuries may result in several types of damage to the intraocular structures. Traumatic hyphema, a result of bleeding from a torn vessel at the iris root may fill the anterior chamber of the globe with blood. Marked loss of visual acuity will result. The patient should be hospitalized and a binocular dressing applied. Coagulants may be of benefit together with sedatives. The blood may hemolyze and absorb spontaneously. The issue of miotics versus mydriatics has not been fully settled. Unfortunately some of these patients may have repeated hemorrhage with the formation of an "eight-ball" clot in the anterior chamber, secondary glaucoma, and corneal blood staining. In these latter conditions the situation shifts from medical management to surgical management and the decision to intervene must be left in the hands of a competent ophthalmic surgeon. The prognosis may be very grave as far as recovery of normal vision is concerned. Contusion injury may also produce lens changes. These, however, may be slow in developing and may become stable for long periods of time. Subluxation of lens from contusion may occur and later lead to secondary glaucoma.

Increased pressure on the globe at the time of contusion is transmitted in all directions, since the globe is an entirely closed system. The macular region is especially sensitive to pressure, due to its relatively poor blood supply. Any evidence of retinal edema in the macular area and loss of visual acuity at the time of examination following a contusion or blunt injury should suggest this possibility to the examiner and the patient started on antispasmodics and/or vasodilators, together with steroid preparations systemically and mydriatics locally. If the visual acuity is relatively normal and the retina appears to be normal also, then the patient should be checked again later to be sure no changes have occurred during the interim period. Failure to recognize this mechanism may result in a macular cyst or hole formation with central scotoma as a permanent change.

Ocular Complications of Distant Injury

Retinal changes due to distant injury should be pointed out. Sudden trauma to the skull, such as a fall on the head from a height or crushing chest injuries may produce the typical picture of Purtscher's[5] retinopathy within one to two days after the injury. Ophthalmoscopically, the examiner sees white exudates, hemorrhages, vascular spasm and macular edema. The patient experiences visual disturbances soon after the injury and may also have peripheral scotomata. After a period of several months, the visual disturbances will disappear. Occasionally there may be a residual pallor to the optic disc. All patients with history of these types of trauma should have careful ophthalmoscopic examinations done in spite of the absence of external evidence of ocular trauma, and any changes found should receive prompt therapy.

General Comment

We have covered some of the commoner forms of ocular trauma. Principles of early diagnosis and management have been discussed. It is beyond the scope of this article to outline many other forms of industrial ocular trauma, such

as radiation injury or irritation by atmospheric contaminants.

Remembering the great advances in medicine in recent years such as antibiotics, corticosteroids, improved instrumentation, general availability of donor ocular material from eye banks, it is thus evident that many eyes which were badly damaged from trauma may now be salvaged. Keratoplasty has proved extremely beneficial in many cases. Reconstructive lid surgery may greatly aid unsightly lesions and add to normal physiologic processes. Where cataracts have formed from trauma, their removal may be enhanced by the proteolytic enzyme alpha-chymotrypsin used as an adjunct for zonulolysis in lens extraction, especially in younger age groups. Newer types of needles, suture materials, and magnification all contribute to the successful visual outcome following ocular surgery for trauma. A thorough knowledge of certain basic principles and their proper application in many cases means a useful eye for the injured worker and the avoidance of all the socioeconomic complications attendant with ocular trauma.

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Scope, Objectives, and Functions of Occupational Health Programs

This statement was approved by the Board of Directors, Industrial Medical Association, October 10, 1960. This statement was prepared by the Council on Occupational Health of the American Medical Association. The original statement was approved by the Board of Trustees in April, 1957, and adopted by the House of Delegates in June, 1957. The following revision was approved by the Board of Trustees in April, 1960, and adopted by the House of Delegates in June, 1960. It was published in the Journal of the American Medical Association *(174: 533-536, Oct. 1, 1960) and is reprinted here with permission.*

The term "occupational health program," as used in this statement, means a program provided by management to deal constructively with the health of employees in relation to their work. The term "occupational medicine" means that branch of medicine practiced by physicians in meeting medical problems and needs under occupational health programs.

Some employers, in the middle of the 19th century, established medical services for their employees in areas where satisfactory medical services were not readily available. Since 1911, workmen's compensation laws requiring employers to compensate employees or their heirs for occupational disability or death and to provide medical care for occupationally injured employees have been enacted in all states. In addition, most of these laws require employers to provide medical care for employees with occupational disease. These and other laws have given employers a greater incentive, as well as an obligation, to maintain safe and healthful working environments. The problems associated with the increasingly complex technology of industry, with ever new, potentially hazardous, physical and chemical agents, have served as an important stimulus to the development of occupational health programs. From these developments the earlier concept of curative occupational medicine has been broadened to include and emphasize prevention and health maintenance, and there has gradually emerged the type of occupational health program described in this statement.

Organized medicine should exercise leadership in improving occupational health programs and in providing adequate occupational health services to all employees, including those in small establishments. The medical profession has a responsibility to bring to the attention of industrial management and labor the values of occupational health services. In assuming this responsibility, the profession should recognize that the considerations and recommendations contained in this statement should not be viewed as being limited to full-time, salaried physicians. They should serve to attract and guide physicians in private practice in rendering part-time or consultant services. It is specifically in the provision of occupational health services to small plants that physicians in private practice can make their greatest contribution. The county medical society should be prepared to help employers locate physicians willing and qualified to direct and serve occupational health programs.

General Considerations

Health maintenance is primarily the responsibility of the individual. However, the employer has an obligation to provide a safe work environment for his employees and he has a valid interest in the prevention of loss of work time and of work efficiency resulting from his employees' ill health. Definitive diagnosis and therapy of nonoccupational injury and illness are not responsibilities of the employer, but he may provide certain preventive health measures in a given situation where the employee, the employer, and the community stand to benefit.

There are two types of health programs for those who work. The one referred to in this statement is the occupational health program that deals with the health of employees in relation to their work and is largely preventive. The other type is a medical care program for nonoccupational illnesses and injuries. These two types of programs differ in such respects as methods of financing and amounts and kinds of services. Failure on the part of employers, employees, and physicians to distinguish properly between these two types of programs sometimes gives rise to misunderstandings and problems, particularly in those few situations in which the same professional personnel serves both programs.

Objectives

The objectives of an occupational health program are (1) to protect employees against health hazards in their work environment; (2) to facilitate the placement and insure the suitability of individuals according to their physical capacities, mental abilities, and emotional make-up in work which

they can perform with an acceptable degree of efficiency and without endangering their own health and safety or that of their fellow employees; (3) to assure adequate medical care and rehabilitation of the occupationally ill and injured; and (4) to encourage personal health maintenance.

The achievement of these objectives benefits both employees and employers by improving employee health, morale, and productivity.

Activities

In order to attain these objectives the following activities are essential.

1. *Maintenance of a Healthful Work Environment*—This requires that personnel skilled in industrial hygiene perform periodic inspections of the premises, including all facilities used by employees, and evaluate the work environment in order to detect and appraise health hazards, mental as well as physical. Such inspections and appraisals, together with the knowledge of processes and materials used, provide current information on health aspects of the work environment. This information will serve as the basis for appropriate recommendations to management for preventive and corrective measures.

2. *Health Examinations*—(*a*) Preplacement examinations. These examinations serve to determine the health status of the individual in order to aid in suitable placement. Such examinations should include (1) personal and family medical history; (2) occupational history; and (3) physical examination, including appropriate laboratory procedures. (*b*) Periodic examinations. These health evaluations are similar to preplacement examinations and are carried out at appropriate intervals to determine whether the employee's health is compatible with his job assignment and to detect any evidence of ill health which might be attributable to his employment. Certain employees and groups may require examinations more frequently than others and additional procedures and tests, depending on their age, their physical condition, and the nature of their work.

All health examinations must be conducted by a physician with such assistance as he requires. The examination may be made in any properly equipped medical facility, at the place of work or elsewhere. However, to qualify as an appropriate part of the occupational health program, the examination must evaluate the health status of the employee in relation to his work.

The individual to be examined should be informed by appropriate means of the purpose and value of the examination. The physician should discuss the findings of the examination with the individual, explaining to him the importance of further medical attention for any significant health defects found.

Unrealistic and needlessly stringent standards of physical fitness for employment defeat the purpose of health examinations and of maximum utilization of the available work force.

3. *Diagnosis and Treatment*—(*a*) Occupational injury and disease. Diagnosis and treatment in occupational injury and disease cases should be prompt and should be directed toward rehabilitation. Workmen's compensation laws and policies of medical societies usually govern the provision of medical services for such cases. Further guidance is offered in the American Medical Association's statement "Medical Relations in Workmen's Compensation," item 4, section on "Statutory Provisions." This appeared in the 1955 annual report of the Council on Occupational Health (*J.A.M.A.* 159: 906-910, Oct. 29, 1955). The statement was adopted, slightly changed, by the House of Delegates (*J.A.M.A.* 159:1648-1649, Dec. 24, 1955). Reprints may be obtained from the Council on Occupational Health. Item 4 appears as paragraph (d) on page 4 of the reprint. (*b*) Nonoccupational injury and illness. Diagnosis and treatment in nonoccupational injury and illness cases are not responsibilities of an occupational health program with these limited exceptions: (1) in emergency, the employee should be given the attention required to prevent loss of life or limb or to relieve suffering until placed under the care of his personal physician, and (2) for minor disorders, first aid, or palliative treatment may be given if the condition is one for which the employee would not reasonably be expected to seek the attention of his personal physician, or to enable the employee to complete his current work shift before consulting his personal physician. Requests for repetitive treatment of nonoccupational disorders should be discouraged and individuals requesting such should be referred to their personal physician.

Every employee should be encouraged to have a personal physician. The health interests of employees are best served by communication and cooperation between their personal physicians and physicians participating in occupational health programs. This helps assure their continuation in or prompt restoration to suitable employment.

4. *Immunization Programs*—An employer may properly make immunization procedures available to his employees under the principles set forth in the "Guide for Industrial Immunization Programs" (*J.A.M.A.* 171:2097-2098, Dec. 12, 1959).

5. *Medical Records*—The maintenance of accurate and complete medical records of each employee from the time of his first examination or treatment is a basic requirement. The confidential character of these records, including the results of health examinations, should be rigidly observed by all members of the occupational health staff. Such records should remain in the exclusive custody and control of the medical personnel. Disclosure of information from an employee's health record should not be made without his consent, except as required by law.

6. *Health Education and Counselling*—Occupational health personnel should educate employees in personal hygiene and health maintenance. The most favorable opportunity for reaching an employee with health education and counselling arises when he visits a health facility.

Health education appropriately goes hand in hand with safety education. The occupational health and

safety personnel, therefore, should work cooperatively with supervisory personnel in imparting appropriate health and safety information to employees. Health and safety education should encourage habits of cleanliness, orderliness and safety, and teach safe work practices, the use and maintenance of available protective clothing and equipment, and the use of available health services and facilities. Experience has shown that health education is most effective when the employer demonstrates his sincere and continuing interest in the health of his employees and when employees are encouraged to participate in the planning and conduct of health education activities.

Organization and Staffing

In order to provide a satisfactory occupational health program, it is essential that a qualified doctor of medicine be engaged to direct the program. The needs of a specific program will determine the amount of time required of this physician. Training and experience in occupational medicine are desirable. The medical director should have a major role in the development, interpretation, and implementation of medical policy. He should administer the occupational health program and be directly responsible to a designated official at the policy making level of management.

Physicians participating in the program: (1) should maintain high standards of professional service and conduct for the benefit of employee and employer alike; (2) should cooperate and maintain proper liaison with other physicians in the community and with the county medical society; (3) should not use their occupational health affiliations improperly as a means of gaining or enlarging a private practice among employees; and (4) should be engaged and compensated in accordance with the Principles of Medical Ethics of the American Medical Association (Special Edition of *The Journal*, June 7, 1958).

The occupational health program should be tailored to each employee group according to its needs. These needs are determined by such factors as the number of employees in the group, the nature and extent of the hazards to which they are exposed, and the availability of community medical services. The personnel required in an occupational health program may include, in addition to physicians and nurses, persons skilled in various technological procedures of environmental appraisal and control, laboratory technicians, other specialized personnel, and clerical help. The amount of time required of such personnel will depend upon the needs of the employee group to be served. The organizational relationships within the group, while varying with circumstances, should be such as to promote maximum collaboration and cooperation.

Nurses in occupational health programs should be graduates of accredited schools of nursing, registered and legally qualified to practice nursing where employed. Training and experience in occupational health are desirable. The nurse's professional duties should be clearly defined in writing by the physician.

In establishments which do not have a nurse, there should be one or more employees qualified in first aid available throughout the working hours. It is desirable, of course, in all employee groups to have a substantial proportion of the employees trained in first aid in the event of emergencies.

Cooperation among physicians, industrial hygienists, nurses, technicians, and other occupational health personnel and management personnel responsible for the employment, safety, and well-being of employees is essential. Occupational health personnel should cooperate also with voluntary and official community agencies providing health, safety, employment, and welfare services.

Facilities

The extent of the facilities, including equipment, will depend upon the needs of the employees and the scope of the occupational health program. The facilities may be available at the place of employment or elsewhere in the community. Facilities when provided on the premises: (1) should be located in a quiet area readily accessible to employees and to transportation; (2) should be sufficiently spacious, well lighted, ventilated, and heated; (3) should include waiting, consultation, examining, and treatment rooms, and toilet facilities, to insure adequate privacy and comfort; (4) should have appropriate medical, laboratory, and other equipment; and (5) may include a rest or recovery room, dressing rooms and facilities for laboratory and radiological examinations.

Summary

This statement provides only a broad outline of the scope, objectives, and functions of occupational health programs. More detailed information can be found in reference works on various aspects of occupational health and through consultation with persons whose professional training and experience have qualified them as specialists in this field. Guidance concerning the development and operation of occupational health programs also may be obtained from county and state medical societies and from the Council on Occupational Health of the American Medical Association.

The goal of occupational health programs in assuring the health of people who work is based on the recognition that the fullest development of our material resources is dependent upon a corresponding development of our human resources.

Industrial Medical Association

THE PRESIDENT'S MESSAGE

ROBERT E. ECKARDT, M.D.

AT ITS MEETING in Charlotte, N. C. on Oct. 10, 1960, our Board of Directors voted two associations to Component Society status: the Rocky Mountain Academy of Industrial Medicine and the Western Ohio Industrial Medical Association. I should like to take this opportunity to welcome officially each of these two associations to Component Society status, and as the newest additions to the ever-growing IMA family, we wish each of them a long, hearty, and lusty life. I am sure that each of these components will contribute immeasurably to the future not only of IMA but also of each of its members. Welcome, and the best of luck to each of you.

The creation of new Component Societies, as with everything new, is a mixed blessing for the IMA. On the whole, encouragement is given to any local group sufficiently large, and sufficiently interested, to develop itself into a Component Society. It is our firm conviction that Component Societies contribute to the over-all understanding and strength of industrial medicine throughout our nation. In the long run they increase our membership, stimulate interest in industrial medicine at the local level, develop an interested group of leaders at the local level who are potential sources of future leadership for IMA, and ultimately develop answers to problems at the local level, thereby solving many of these problems in the early stages. The growth in the number of Component Societies in recent years is adequate testimony to the great contributions we in IMA feel they make to the future of industrial medicine. These two new members having just been added to the family, there are already indications that additional components are forming. As with our district counselors, the day may yet come when each state has at least one component.

The problems which arise with the formation of new Component Societies are relatively minor but nonetheless cannot be overlooked. One such problem arises when a component is formed from among members of an already existing component. This situation arose when the Minnesota Academy of Occupational Medicine and Surgery formed itself principally from members of the Central States Society of Industrial Medicine and Surgery. Through a forward-looking and statesman-like attitude on the part of the latter society, no real controversies developed, and in fact on Dec. 3 the two societies held a joint meeting in Milwaukee, to the advantage of both societies.

A second problem arises over boundary lines for two components which may have some geographic overlap. Thus the newly created Western Ohio Society might more logically draw to its meetings certain members in the Newport-Covington, Ky. area, whereas men from the Akron-Cleveland area might more logically attend the Pittsburgh Component meetings. Likewise the Rocky Mountain Academy extends into states whose members have in the past affiliated with the Western IMA. These problems are not insoluble to intelligent, thinking men, but they do need careful review and consideration if understanding solutions are to be reached. I have created a special Ad Hoc Committee of past presidents, under the chairmanship of Dr. George Wilkins, to consider such boundary problems and make recommendations to our Board of Directors. It is likely that some arbitrary decisions will have to be made which may not be to everyone's immediate liking, but I feel sure that time, and intelligent understanding, will lead to equitable solutions.

Finally, and perhaps the least important consideration, is the loss of income to IMA when

a component is formed among presently direct members. For instance the two newly created Component Societies resulted in a net loss of immediate revenue to IMA of $485. In these days of a strapped IMA financial situation, any loss in revenue is serious to IMA. However, we feel this loss is well justified because eventually it will lead to increased interest and membership.

As evidence of our faith in the long-range benefits of Component Society membership, the IMA a few years ago established the policy that it would not accept direct members when the members resided in the area of an already existing component. Thus it transferred to Component Society membership a great number of previously existing direct memberships. In a society which has doubled its membership in the last decade, I think we have nothing to fear from temporary loss of revenue from the creation of new Component Societies. In addition, the financial support as well as the enthusiastic moral support given IMA by its components over the past few years, previously acknowledged in my December page, adequately supports our belief in the real value of our Component Societies. It is my sincere hope that any group which feels it may have the potential for the formation of a new component will write Mr. Clark Bridges at our home office, 28 East Jackson Blvd., Chicago 4, and obtain a copy of the guiding principles for the formation of Component Societies prepared by our By-Laws Committee.

To our two newest components, the Western Ohio Industrial Medical Association and the Rocky Mountain Academy of Industrial Medicine, again—Welcome! And all the best of luck to you in the future. And to all IMA members, may the New Year be the very best ever for you.

Letters

TO THE EDITOR: In behalf of my confreres, I wish to thank you for the fine report of the 13th International Congress. I am sure you and your readers realize that many workers whose names do not appear in your brief review made sizable contributions to the success of this meeting. By no means were they all located on the "East Coast." The numerous evidences of cooperation on the part of the several professions and their respective organizations are fine tributes to the American industrial health team.

I would also call your readers' attention to the sizable financial support provided by labor and government as well as by industry.

—LEO WADE, M.D.

Publications Available

The following list of publications has been compiled on the basis of probable interest to the readers of this journal and is presented solely for the purpose of giving notice of their availability.

Examinations for Cervical Cancer. Public Health Service Publication No. 707, 1959. Leaflet. Available without charge from the U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Occupational Health, Washington 25, D.C.

This leaflet briefly describes digital and visual examinations, Papanicolaou smear, and Schiller test and biopsy. The advantages of early diagnosis are depicted, and seven steps are outlined for the prevention and control of cervical cancer.

Air Sampling Instruments for Evaluation of Atmospheric Contaminants. Price $7.50. Pp. 309, plus foreword and index. American Conference of Governmental Industrial Hygienists, 1014 Broadway, Cincinnati 2, Ohio.

The manual was prepared by members of ACGIH. It is developed from information provided by manufacturers, interpreted and usually checked by the authors of various sections of the manual. One section provides a detailed discussion on home-assembled instruments. Photographs of instruments and illustrative drawings are included in great number, probably averaging one a page. The manual has a loose-leaf binding with a separate numbering sequence for each section, making replacement of pages a practical matter.

Report of the Committee of Inquiry on Anthrax. Price, 12s, 0d ($1.68). Pp. 222. Her Majesty's Stationery Office, London. Available from British Information Services, 45 Rockefeller Plaza, New York 20, N.Y., 1959.

The Committee was appointed to consider the existing legal provisions concerning the importation of goods infected or likely to be infected with anthrax, and the precautions to be taken in this connection. The text of the report begins with the basic epidemiology of anthrax and then considers various sources of infection. There follows a set of specific recommendations as next steps to ensure prevention of the disease among workers. The appendix constitutes the major portion of the report and presents, predominantly by means of tables, the data developed by the Committee.

Color Additive Amendments of 1960 with Explanation. Food-Drug-Cosmetic Law Reports. Second Extra Edition No. 273, July 13, 1960. Price, $1.00 (1-4 copies), $0.90 (5-9 copies), $0.85 (10-24 copies), $0.75 (25-49 copies), $0.70 (50-99 copies). Pp. 31. Commerce Clearing House Products Co., 4025 W. Peterson Ave., Chicago 46, Ill.

Commerce Clearing House Inc., has prepared an interpretation and explanation of the provisions of the Color Additives Amendments, enacted into law on July 12, 1960. The full texts of the amendments are included.

Editorials

Emergency Lifesaving

THE RECENTLY published studies on closed-chest cardiac massage, by a group of investigators at The Johns Hopkins University headed by Dr. W. B. Kouwenhoven,* make it necessary to reconsider a fundamental first-aid procedure in industry. This has to do with the revival of a victim of an accident who is found to be unconscious, pulseless, and either apparently dead or dying. When this situation results from electric shock, it should be assumed that the physiologic disturbance is either ventricular fibrillation or complete cardiac arrest. The precise diagnosis could be established by immediate electrocardiography, which is usually out of the question at the time and place of an industrial accident. This distinction is, however, of academic interest only at the moment of crisis, since in either case an adequate cardiac output can and must be maintained by closed-chest cardiac massage.

The procedure itself is simple, and can be taught readily to those employees who are normally entrusted with first-aid responsibilities. The victim is laid flat on his back on any firm surface. The first aider kneels beside the victim, facing the victim's head. The first aider then applies the heel of one hand upon the victim's chest at the lower end of the victim's sternum. The heel of the other hand is brought down over the first. The anterior chest wall now is forced vertically downward for a distance of 3 to 4 cm at the rate of 60 times per minute, permitting the chest to reexpand spontaneously after each compression. The Johns Hopkins studies show that the heart empties when compressed in this way between the sternum and the spine, and refills when the sternum is allowed to return to its former position. Useful circulation was thus maintained for as long as 30 minutes in experimental dogs, and for periods up to 65 minutes in hospitalized patients. Although some pulmonary ventilation is incidentally produced by closed-chest cardiac massage, mouth-to-mouth artificial respiration should be administered at the same time by another first aider.

If the victim does not respond to these first-aid measures, the next step constitutes a major medical procedure. An electrocardiogram will reveal whether the problem is one of persistent ventricular fibrillation or cardiac standstill. Defibrillation can be accomplished by a transcardiac pulse of alternating current of about 5 amperes for a period of 0.25 second, provided by means of a closed-chest defibrillator.† Persistent cardiac standstill is an indication for intracardiac injection of epinephrine.

Artificial respiration to date has been the procedure of choice for industrial accident victims found to be unconscious, apneic, and pulseless. In cases of asphyxia by certain industrial gases, the procedure may get at the basic cause. But when this sort of problem is complicated by cardiac arrest or ventricular fibrillation, artificial respiration by itself falls short of the goal of patient revival just as it does in cases of accidental electric shock. Many of us have had the experience of standing awkwardly at hand while first-aid teams plied their art hour after useless hour in an attempt to restore a victim whose problem was cardiac rather than respiratory in origin.

One hesitates to place upon first-aid personnel the awesome responsibility of a decision between closed-chest cardiac massage and artificial respiration in cases in which there is doubt as to the status of the victim or the cause of his problem. What is needed now is an emergency lifesaving procedure which uses both modalities in such a way as to comprehend all needs and ensure necessary actions in the best chronological sequence.

*Kouwenhoven, W. B.; Jude, J. R.; and Knickerbocker, G. G.: Closed-Chest Cardiac Massage, *J.A.M.A.* 173:1064 (July 9) 1960.

†Kouwenhoven, W. B.; Milnor, W. R.; Knickerbocker, G. G.; and Chestnut, W. R.: Closed-Chest Defibrillation of Heart, *Surgery* 42:550-561 (Sept.) 1957.

Dr. Lewis Comes Aboard

WE BEGIN Volume 3 of our journal with another expansion of the editorial staff. Charles E. Lewis, M.D., Sc.D., has accepted an appointment as Assistant Editor, with the responsibility to assist generally in the processing of manuscripts. Dr. Lewis has performed in this capacity unofficially for some time in

addition to contributing topical reviews in toxicology. His recent move to the University of Kansas as Associate Professor of Preventive Medicine is noted elsewhere in this issue. Edward V. Henson, M.D., will continue as Assistant Editor in charge of our abstracts section and will continue to contribute along broader lines. As time goes on, portions of the editorial function become definable segments which can be split off as particular jobs. What started out as a highly centralized operation, with all of the risks associated with that characteristic, is developing satisfactory organizational depth.

Book Reviews

OCCUPATIONAL DISEASES AND INDUSTRIAL MEDICINE. Rutherford T. Johnstone, M.D. and Seward E. Miller, M.D. Price, $12.00. Pp. 482. W. B. Saunders Co., 218 W. Washington Sq., Philadelphia 5, Pa., 1960.

By DAVID GOLDSTEIN, M.D.

Rutherford T. Johnstone, M.D., has joined hands and intellect with Seward E. Miller, M.D., in what is more than a revision of the former's text, "Occupational Medicine and Industrial Hygiene," published in 1948. The collaboration has been a happy one, and the new title symbolizes that which is more than a "new look"; this is a new book.

To quote from the preface: "Part I covers the broad spectrum of industrial medicine. Here will be found information about the multiple facets of medical practice as they relate to industry and to our industrial society, culminating in Chapter 7, the Diagnosis of Occupational Diseases. Part II is devoted to the clinical approach to occupational diseases and largely retains the format used in earlier books written by the senior author. His clinical and toxicologic experience, combined with the clinical teaching and pathologic experience of the junior author, provides a more complete coverage of the occupational disease entities than otherwise could be accomplished."

The authors have designed their book for practitioners of industrial medicine, students, and teachers, "more than for the experts. . . ." It is well that they have said this, for again and again in the reading, this reviewer, at least, experienced a desire for an expanded treatment of many of the subjects. In all fairness it must be pointed out that the text runs 482 pages. Selling as it is for $12.00, one might reasonably expect that any expansion would price the book out of the very market for which it is intended. Since every section of the book is pertinent, practical, and applicable, more detail could not have been accomplished by deleting essential material. It is obvious that the field of occupational medicine has become too vast and complex to treat in appreciable depth in a single volume. The saving grace of the brevity of Johnstone and Miller's book is the attention given to bibliography. At the end of each chapter is to be found an extended reference list which combines that which is current as well as that which is a worthy contribution to the subject.

Although no chapter is devoted to the occupational dermatoses, those substances which are skin irritants and sensitizing agents receive passing comment. In view of the plea registered above for more depth of coverage, any brief attempt to summarize the dermatoses would be willingly to contribute to superficiality. But should the general physician practicing part time in industry comprise a sizeable segment of this text's reading public, then this is an important omission.

The first quarter of the book is devoted to the practice of industrial medicine. The theme of the occupational health team is well developed, and, in particular, justice is done to the role of the nurse in industry. The importance of record keeping is brought out, and the use of standard absence indices based on calendar days lost is recommended, i.e. frequency, severity, and disability rates. But lacking is any reference to the standardization of diagnostic coding and the use of key sort of automated record tabulation methods.

The major portion of the book is devoted to the occupational diseases. It is here that the promise in the preface of the fruits of pooled clinical experience is brought to fruition. The frequent use of case histories adopted by the senior author in his earlier texts is profitably repeated. Occasionally the histories are a shade anecdotal, and the reader must decide whether he prefers his facts with or without flavor. The noxious gases and the hydrocarbons, both aliphatic and aromatic, are adequately presented. Perhaps trichloroethane (methyl chloroform) deserved more than a single sentence, considering its wide use and relatively low toxicity.

The presentation of the pneumoconioses is excellent. Impressive was the account of the bagassosis outbreak in Puerto Rico which took place in the latter part of 1959 and which was first reported in July, 1960, at the 13th International Congress in New York. Clearly, throughout the entire book an intense effort has been made to be current.

The chapter on the metals is uniformly good. Again the weight of extensive clinical experience is registered. As expected, the section on lead poisoning is tops and E.D.T.A. (edathamil) therapy coupled with appropriate caution is presented in a fashion adaptable for bedside use by the practitioner.

The remaining chapters are devoted to infectious occupational diseases, occupational cancer, synthetic

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resins and plastics, propellants, fuels and oxidizers, the pesticides, physical agents, and ionizing radiations. Virtually all of this material has been freshly written and is not to be found, with few fragmentary exceptions, in Dr. Johnstone's earlier texts.

The section on occupational cancer has been fashioned into a compact and tidy review of the present status of this still evolving subject.

The book concludes with an appendix devoted to threshold limit values for 1960 and a glossary of some industrial terms.

In summary, the authors are to be congratulated or having accomplished their mission, to provide a comprehensive text for students of occupational medicine. It should find a wide and willing public among the undergraduate and postgraduate student body of the English-speaking world. It will eventually find its way into the law offices as well.

AIR SAMPLING INSTRUMENTS FOR EVALUATION OF ATMOSPHERIC CONTAMINANTS. Air Sampling Committee, American Conference of Governmental Industrial Hygienists. Price, $7.50. American Conference of Governmental Industrial Hygienists, 1014 Broadway, Cincinnati 2, Ohio, 1960.

By EDWARD C. RILEY, M.D.

In this manual the government industrial hygienists have brought together a tremendous amount of information both theoretical and practical concerning the various types of instruments which are available for air sampling. Although most of the instruments described are produced commercially, there are frequent references to modifications which can be made to permit adaptations of a commercial product to a particular air-sampling problem. This should be a valuable reference for anyone undertaking a program of air sampling, since it balances theory and practical experience in this field and provides a valuable list of suppliers of proved sampling instruments.

The manual is carefully organized, starting out with a technical section in which the various types of instruments are discussed by authorities in the field of air sampling. After the general discussion, the individual instruments are discussed in considerable detail and are grouped according to the principle on which the sampler operates. The first group —impingement sampling devices—reviews 10 different instruments utilizing the impingement principle; following this is a discussion of filter media samplers, and 16 instruments are presented. A group of six instruments is discussed under the head of impaction devices, including the Conimeter and the Cascade Impactor.

Leaving particulate samplers, the discussion turns to direct-reading instruments for such specific contaminants as mercury, vapor, halides, carbon monoxide, carbon dioxide and to combustible gas indicators, oxygen indicators, etc. The section on gas and vapor samplers includes instruments for detecting nitrogen dioxide, chlorinated hydrocarbons, fluorides, sulfur dioxide, etc., of which six are listed.

There is a separate section on colormetric gas and vapor detectors in which 17 instruments for detecting carbon monoxide, aromatic hydrocarbons, hydrocyanic acid, hydrogen sulfide, sulfur dioxide, hydrogen fluoride, unsymmetrical dimethyl hydrazine, toluene diisocyanate, arsine, and lead.

Section H covers electrostatic precipitators, listing five instruments. Section I covers four thermal precipitators, following which includes such items as sequential samplers, particle size analyzers, stack samplers, and radon detectors.

This publication is something of a compromise between a collection of commercial catalogs and a textbook on the theory of sampling instruments. It includes a great deal of detailed technical information concerning the construction and operating characteristics of various commercial instruments and at the same time provides some of the theoretical background which would enable the potential user to determine his own specific requirements. It should prove most helpful to persons planning to enter the air-pollution field and not already thoroughly familiar with the instrumentation problems which will be encountered.

Dr. Riley, who is trained both as an engineer and a physician, is in the Laboratory of Industrial Medicine, Eastman Kodak Company, Rochester, N.Y.

ANNUAL REVIEW OF PHYSIOLOGY. Edited by Victor E. Hall, Editor, Frederick A. Fuhrman and Arthur C. Giese, Associate Editors, Stanford University. Ed. 22. Price, $7.00. Pp. 725. Annual Reviews, Inc., and the American Physiological Society, Palo Alto, Calif., 1960.

By EUGENE L. WALSH, M.D.

This, the 22nd edition, reviews the comparative and human physiological literature through about mid-1959. Selected areas of circulatory, intestinal, renal, endocrine, and nervous system physiology are presented. Chapters on cellular physiology, genetics, and reproduction are included. The task of review has been assigned to 19 eminent scientists and teachers. Each has accepted the challenge and has presented his specific area lucidly. In the 643 pages of text, about 5,000 references are cited, digested, and presented in a logically flowing, narrative sequence. Sixty-four pages of author and subject titles produce an effective, usable index.

This is a standard review for the physiologist. For the clinician, facets of specialty interest are recommended; however, for routine professional reading, the material is too fundamental.

If one can indulge himself in the luxury of professional browsing and desire to scan the recent advances in the fundamental sciences, this volume can be commended. It is well done and maintains the high quality of selection and coverage of the Annual Reviews Series.

Dr. Walsh is Director of Medical Service, International Harvester Company, Chicago.

Abstracts of Current Literature

Radiation Health

Findings of a Survey of X-Ray Units. W. R. Stahl, R. R. Sullivan,* and D. G. Wagstaff. Pub. Health Rep. 75:652 (July) 1960. (*Oregon State Board of Health, Portland, Ore.)

A survey of approximately 25% of all users of diagnostic x-ray units in Oregon showed that the radiologists and hospitals under the direction of radiologists used better techniques for reducing radiation exposures to the patient than other groups. Film badges should be used much more widely for documentation of personnel exposures. Other protective techniques that were found lacking in a large percentage of users include proper collimation, adequate filtration for both roentgenography and fluoroscopy, and higher kilovoltage techniques. In addition, use of full film processing (five-minute development), fast film, local gonadal shielding for persons younger than age 40, and fast intensifying screens will provide further reductions in radiation doses. Successful application of these techniques on a wide scale will reduce population gonadal exposure from diagnostic x-rays to one-half and perhaps to as little as one-fifth of present exposure. —G.L.V.

Some Physical and Physiological Factors Controlling the Fate of Inhaled Substances: II. Retention. L. J. Casarett.* Health Physics 2:379 (May) 1960. (*Department of Radiation Biology, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.)

Insoluble particles deposited in the lung by inspiration may be removed by four mechanisms: namely, ciliary action, phagocytosis, lymphatic absorption, and solubilization. Aspects pertinent to calculation of a radiation lung dose include the variable rate of particle movement by the cilia from 0.15 cm/min in bronchioles to 4 cm/min in the trachea and the fact that at some points mucus flows over as little as 10% to 20% of the calculated surface area, especially at bronchiolar branch points where accumulations of particles are seen. Phagocytic cells containing particles may move up the respiratory tree or pass through interstitial tissue where they may enter the lymph or blood vessels. The site of entry into the lymphatic system is not known precisely, but it appears to depend on initial phagocytosis of the material. The accumulation of radioactive particles in the lymphoid tissue requires careful assessment of the radiation dose to that organ. —G.L.V.

Symposium on the Delayed Effects of Whole-Body Radiation, October 29, 1959. Edited by B. B. Watson.* Report No. ORO-SP-127. (*Operations Research Office, The Johns Hopkins University, Bethesda, Md.)

The current state of knowledge of four major delayed effects of nuclear radiation—life shortening, leukemia and other malignancies, cataracts, and genetic alterations—is summarized. Human data on radiologists and Japanese atom-bomb survivors have not effectively demonstrated a shortening of life span. The mathematical extrapolations used to project animal data to man provide values of questionable validity, since they depend on highly speculative assumptions and relatively few animal experiments. The association of prior irradiation and an increased incidence of leukemia has been clearly demonstrated in all groups studied. Human data are not sufficient to determine induction rate of leukemia at lower radiation doses or the existence of a threshold phenomenon. The incidence of thyroid adenomas seems to be greatly elevated in children given 200 r or more to the chest. The problem of evaluating human genetic alterations is complicated by the lack of such fundamental information as the present total mutational load, the spectrum of mutations expected, and the selection pressures operating in human populations. The prediction of the human mutation rates produced by radiation exposure by use of mouse data is probably sufficiently accurate in view of the lack of other fundamental information.

—G.L.V.

Industrial Hygiene Controls

Determination of Decaborane and Pentaborane by Means of Triphenyltetrazolium Chloride. W. H. Hill* and others. Am. Indust. Hyg. A. J. 21:231 (June) 1960. (*Dept. of Occupational Health, Graduate School of Public Health, University of Pittsburgh, Pittsburgh 13, Pa.)

In addition to reviewing the literature and a considerable amount of laboratory experimentation in an effort to develop a suitable indicator for the colorimetric analysis, the authors present some specific techniques for sampling and measuring the concentration of these two boranes. Basically, they make use of the conversion of triphenyltetrazolium chloride (TTC) to formazan red with the removal of the chloride ion. Difficulty was encountered in finding a suitable solvent for the formazan red, which is insoluble in water. Furthermore, the reaction requires an alkaline medium. In order to avoid a two-phase system a pyridine-water mixture was used and several proportions tested. Curves are given for mixtures varying from 70% to 90% pyridine. Another solution using 10% by volume of pyridine and the addition of Triton X-45 to prevent the precipitation of formazan was evaluated. Although the concentration of TTC did not appear critical, they recommend any concentrations from 1% to 5%. The authors present a spectrophotometric absorption curve for the formazan derived from triphenyltetrazolium chloride which shows maximum absorption in the range of 490 mμ, which was the recommended wavelength

for this type of analysis. The TTC reaction is applicable to diborane, metaborane, and decaborane. Instruments for monitoring industrial atmospheres have been devised. The reaction is nonspecific, since formazan red is formed by many reducing agents, and much work remains to be done to fully evaluate the usefulness of these techniques.

—E.C.R.

Toxic Hazards During DDT- and BHC-Spraying of Forests Against Lymantria Monacha. M. Wassermann,* S. Illiescu, G. Mandric, and P. Horvath. A.M.A. Arch Indust. Health 21:503 (June) 1960. (*Iasi, Rumania.)

This study of the toxic hazards from the use of insecticides in forest-spraying operations includes environmental insecticide concentrations during three types of ground spraying and airplane loading of insecticides for application to forest areas. The concentrations have been expressed in terms of mg/M^3 and converted to inspiratory exposure which is given as mg/kg of body weight for eight-hour exposures. The mean concentrations of benzene hexachloride (BHC) in the breathing zone of the exterminators during ground application in the forest range from 3.2 to 8.1, depending upon the type of dispersing machine, with a maximum single sample of 12.5 and a minimum of 2.6 mg/M^3. In handling the material from the storage warehouse, concentrations range from 40 to more than 50 mg/M^3 with a mean of 48.4. During the loading of the airplane, somewhat lower concentrations of 32.3 to 39.8 were observed for BHC. Some studies of the DDT concentrations showed mean concentrations varying from 7.7 to 20.3 mg/M^3 at the breathing zone of the exterminators, depending upon the type of equipment used, with an extreme range of 4.6 to 25.5 mg/M^3. Again, the concentrations were 5 to 10 times greater during work in the storage area and during loading of the airplane.

The authors have also presented dermal exposure values for BHC and DDT determined for exterminators while using one type of equipment. The dermal exposure is the quantity of toxic agent per kilogram of body weight which is deposited on the bare skin of a subject of 70 kg during an eight-hour day. An attempt was made to estimate the area of the skin surfaces not covered; this included the face, hands, and V of the chest. From sample pads placed on the shoulder, forearm, and front of the neck, computations of contamination expressed in mg/kg for eight hours showed that skin exposure was many times the respiratory exposure. This spraying operation, which lasted about 30 days, was apparently quite successful in controlling the caterpillars. Although no lethal intoxications were observed, the authors felt that some of the traumatic accidents caused by the falling of horses loaded with benzene or insecticide containers may have resulted in part from the toxic action of the insecticides on the animals. These accidents may have been prevented by respiratory protection of the animal. They also pointed out that when an invisible insecticide aerosol is used there is a tendency on the part of the personnel to remain nearly indifferent to dermal and respiratory exposures.

—E.C.R.

Experimental Toxicology

Experimental Study on Poisoning by Carbon Disulfide and Hydrogen Sulfide. T. Wakatsuki. Shikoku acta med. (Tokushima) 15:671 (Sept.) 1959; Air Pollution Control A. Abstr. 6:3222 (Aug.) 1960.

Several groups of rabbits inhaled either 400 ppm carbon disulfide, 100 ppm hydrogen sulfide, or a mixture of the two at these concentrations for one-half hour daily for four months. The general condition of the rabbits, body weight, number of erythrocytes and leukocytes, serum calcium, and total serum protein were essentially normal in the groups exposed to CS_2 or H_2S. Some slight changes (slight decrease of albumin in serum protein, increase of β and γ globulin, decrease in albumin-globulin ratio, oligochromemia, increase in reticulocytes, and presence of toxic granules) returned quickly to normal after exposure was stopped. Similar slight changes were seen in the group exposed to the mixture of the two gases, but restoration to normal was much slower, and complete restoration was not achieved. A synergistic action between the two gases is suggested.

—R.E.E.

Storage of Dieldrin in Tissues and Its Excretion in Milk of Dairy Cows Fed Dieldrin in Their Diets. N. Gannon, R. P. Link, and G. C. Decker. J. Agric. Food Chem. 7:824 (Dec.) 1959. Pub. Health Eng. Abstr. 40:17 (July) 1960.

Dieldrin, fed in the diet of dairy cows at levels of 0.1, 0.25, 0.75, and 2.25 ppm, appeared in the milk at the end of 6-12 weeks at average levels of 0.2, 0.06, 0.11, and 0.28 ppm, respectively. Dieldrin was also present in fats at concentrations varying from 0.24 ppm at the lowest feeding level to 5.48 ppm at the highest. Amounts found in other tissues were proportional to their fat content.

—R.E.E.

Carcinogenic Studies on Petroleum Asphalt, Cooling Oil, and Coal Tar. W. C. Hueper* and W. W. Payne. A.M.A. Arch. Path. 70:372 (Sept.) 1960. (*National Cancer Institute, Bethesda, Md.)

Experimental data are presented to support the contention that the induction of sarcomas in rats by injection of materials is sufficient proof of their carcinogenicity. In 250 mice painted with four road asphalts, there were 2 with carcinomas and 2 with papillomas of the skin; 16 sarcomas of the thigh were induced in 200 rats and 120 mice. Leukemias seen in mice painted with two of the asphalts were also interpreted as related to treatment. A roofing asphalt was inactive in skin-painting studies. A coal tar induced many

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skin tumors and sarcomas of the thigh. No tumors were induced by exposing rats and guinea pigs to coal tar and roofing asphalt vapors; one carcinoma of the lung was seen in a group of 105 rats and 65 guinea pigs exposed to a mist composed of a mixture of lard oil and a petroleum cutting oil described as a "neutral paraffin oil." In 50 mice painted with this same oil, there appeared one carcinoma and one papilloma of the skin. No sarcomas were induced in 100 mice given intramuscular injections of this oil. Lymphomatous and leukemic reactions in mice were also interpreted as related to treatment. —R.E.E.

A Correlated Histological, Cytological, and Cytochemical Study of the Tracheobronchial Tree and Lungs of Mice Exposed to Cigarette Smoke: III. Unaltered Incidence of Grossly Visible Adenomatous Lung Tumors in Female CF_1 Mice After Prolonged Exposure to Cigarette Smoke. R. Leuchtenberger,* C. Leuchtenberger, W. Zebrun, and P. Shaffer. Cancer 13:956 (Sept.-Oct.) 1960. (*Western Reserve University, Cleveland, Ohio.)

No increased incidence over controls of grossly visible adenomatous lung tumors was seen in 231 female CF_1 mice exposed daily to the smoke of from ½ to 8 cigarettes at hourly intervals for periods of up to 600 days. —R.E.E.

Environmental Physiology

Effects of a Short Period of Training of Varying Severity on Some Measurements of Physical Fitness. J. V. G. A. Durnin,* J. M. Brockway, and H. H. Whitcher. J. Appl. Physiol. 15:161, 1960. (*Institute of Physiology, University of Glasgow, Scotland.)

To determine whether a short period of training can improve physical fitness, the authors measured cardiopulmonary function in 44 untrained young men during a submaximal test exercise on a treadmill before, at the midpoint of, and after a 10-day training period. A control group of eight men performed minimal training. The first test group of 12 men walked 10 km a day on a hilly outdoor course for the 10-day period, the second walked 20 km, and the third walked 30 km over the same course. The heart rate during test periods on the treadmill decreased significantly subsequent to training in all three test groups but not in the control group. Recovery heart rates were less consistent and of less value in comparing the four groups. The 20-km group also showed significant decreases in pulmonary ventilation and in O_2 consumption, whereas no significant changes in these indices of physical fitness were observed in either of the other two test groups or in the control group.

It is concluded that significant improvement in physical fitness is possible after short periods of training. Walking 20 km a day appeared to be the optimal level of severity below or above which improvement in physical fitness fell off. The authors regard tests of physical fitness which require maximal effort (e.g., Harvard Step Test) of limited value except for screening purposes. They also feel that many studies reported by others lack a firm statistical foundation, such as test and retest in the same group and the use of controls to avoid bias from practice effects on other causes. —D.M.

Observations on Dehydration and Sweating. C. S. Leithead* and M. A. Pallister. Lancet 2:114 (July 16) 1960. (*The Liverpool School of Tropical Medicine, Liverpool, England.)

Measurements of urine volume, body weight, blood pressure, and pulse rate were made in 18 fit young men of the Royal Air Force for 3 days prior to their departure from the United Kingdom (U. K.) and twice daily for the first 10 days after their arrival in Bahrein on the Persian Gulf in June and July, 1959. Environmental temperatures during duty hours at Bahrein averaged 94° F dry bulb and 80° F wet bulb. Duties of the subjects were nonstrenuous.

Urine volume dropped from an average of 1,070 ml per 24 hours in the U. K. to 567 ml in Bahrein, where volumes as low as 300 ml per 24 hours were observed in 10% of specimens. Low urine volume was associated with loss in body weight compared with the mean value. These two measures were interpreted as indicating dehydration with which were associated a significant reduction in sweat rate, an elevation of standing pulse rate, and a decrease in pulse pressure. These findings indicate that unacclimatized men transferred to a hot climate become dehydrated despite availability of ample potable water, and dehydration suppresses sweating and impairs circulatory adjustments to heat. —D.M.

Surgery

Spontaneous Femoral Neck Fracture Following Pelvic Irradiation. J. G. Finder* and M. Post. Arch. Surg. 81:545 (Oct.) 1960. (*Department of Orthopedic Surgery, Michael Reese Hospital, Chicago, Ill.)

The authors present three cases and review the literature concerning spontaneous femoral neck fracture after pelvic irradiation. The estimated tolerance dose of bone is 3,840 to 4,320 r, which produces temporary to prolonged inactivation of bone. Dosage above this level causes bone injury. Several concepts of pathogenesis are offered: (1) radiation causes an endarteritis in the arteries supplying the bone, (2) the irradiation depresses the activity of bone cells, having greater damaging effect on osteoblasts than osteoclasts. Thus, bone production is delayed while bone resorption continues with resultant osteoporosis. The second concept seems more likely. With the development of an area of osteoporosis across the femoral neck, fracture is then likely to occur from ordinary stress. The authors point out that the onset may be insidious or sudden and may occur

within months or years of the time of the original irradiation of the pelvis. Clinically, the patient experiences progressive pain and limited hip motion. Initially, the lesion may not be apparent on x-ray study except as osteoporosis in the neck of the femur. After the fracture does appear, it may be difficult to distinguish from a pathologic fracture due to malignancy. The authors advise biopsy of the lesion, and if it proves to be a radiation fracture they advise internal fixation with a bone graft. They feel that this offers a good outlook. —O.M.

Chemically Modified Adrenocortical Steroids. E. W. Boland.* J.A.M.A. 174:835 (Oct. 15) 1960. (*St. Vincent's Hospital, Los Angeles, Calif.)

Boland notes that the steroids as treatment agents for rheumatic arthritis have a suppressive action rather than a curative action. They restrain inflammatory or hypersensitivity responses in a nonspecific manner. Their influence exists only during their administration. After prolonged use, they inhibit endogenous adrenocortical function. In addition to their anti-inflammatory effect, they exert multiple physiologic actions. With the use of effective dosages, "side-effects" such as excessive appetite, weight gain, hypertrichosis, acne, striae, osteoporosis, blood pressure elevation, nervous irritability, retardation of fibrosis and delayed wound healing, thinning of the skin, and masking of infections may occur. During their use, complications such as peptic ulcer, compression fractures, phlebitis, emotional or psychotic disturbances, and necrotizing vasculitis may occur. The author compares the therapeutic effect of six chemically modified adrenocortical steroids upon rheumatic arthritis. The drugs are prednisone, predisolone, methylprednisolone, triamcinolone, dexamethasone, and fluprednisolone. Desired antirheumatic effects can be obtained from all noted. The therapeutic index (ratio of the effective dosage to the dosage that will cause its own characteristic undesirable side-effects) is about the same for prednisone, prednisolone, and methylprednisolone, all of which are superior to cortisone and hydrocortisone and are preferred for routine use in rheumatoid patients Triamcinolone and dexamethasone are considered special-purpose steroids. Fluprednisolone from preliminary study appears to be a satisfactory antirheumatic agent free from salt-retention effects. —O.M.

The Effect of Ganglionic Blockade on Survival After Tourniquet Shock. N. J. Saltz.* Arch. Surg. 81:618 (Oct.) 1960. (*Rothschild Hadassah University Hospital, Jerusalem, Israel.)

Saltz observes that resistance to traumatic shocking procedures has been observed in animals previously subjected to spinal anesthesia or to bilateral thoracolumbar sympathectomy. The use of ganglionic blocking agents has been suggested in the treatment of shock. The author describes a rat experiment to test this hypothesis. In the experiment, shock is induced by tourniquets applied high on the thighs of rats for periods of two-, three-, four-, and five-hour periods. A powerful and quickly acting ganglionic blocking agent, trimethaphan (Arfonad), was given to the rats intraperitoneally. The drug was given to four different groups of animals after four- and five-hour periods of tourniquet maintenance. In one group of animals that had the test five hours, it was found that the mortality was 100% if the animals were untreated, 25% if the animals were infused with 15% of the body weight of isotonic saline solution, and 82.5% if the animals were given 10 mg/100 gm of body weight of trimethaphan 20 minutes prior to the release of the tourniquet. Saltz felt that the use of the vasodilator drug in the preshock phase reduced blood pressure and vasoconstriction to such a degree that fluid loss in the diminished area was decreased in both rate and volume. The increased survival rate is due to a lesser stress due to a lesser fluid loss rather than to the release of vasoconstrictor tone. Saltz felt that the use of ganglionic blocking agents in shock was contraindicated and advocated rapid restoration of blood volume as the safe and logical method of therapy for shock due to fluid volume loss. —O.M.

Clinical Toxicology

Studies on the Industrial Hygiene and Toxicology of Triphenyl Phosphate. W. L. Sutton, C. J. Terhaar, F. A. Miller, R. F. Scherberger, E. C. Riley, R. L. Roudabush, and D. W. Fassett.* Arch. Environ. Health 1:33 (July) 1960. (*Laboratory of Industrial Medicine, Kodak Park, Rochester 4, N. Y.)

Triphenyl phosphate is made by reacting phenol with phosphorus oxychloride. This material has a relatively low order of acute toxicity for rats, mice, and guinea pigs. It produced delayed generalized illnesses and paralyses in cats. It is absorbed slowly from the gastrointestinal tract. It does not produce skin irritation and is absorbed poorly percutaneously. Cholinesterases are inhibited in vitro and in vivo. Medical examinations of men exposed to a weighted average air concentration of 3.5 mg per cubic meter of triphenyl phosphate dust and vapor mist for as long as 10 years did not reveal evidence of adverse clinical defects.

The toxicologic methods, environmental sampling and analytic techniques, manufacturing process, and medical evaluation procedures are discussed in considerable detail. The results of the various studies are set forth in numerous tables. —L.H.M.

Massive Pneumoconiosis from a Rock Dust Containing No Free Silica: Nepheline Lung. H. J. Barrie and L. Gosselin.* Arch. Environ. Health 1:109 (Aug.) 1960. (*Department of Pathology, Banting Institute, University of Toronto, Toronto, Canada.)

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Nepheline rock is milled to a fine powder and used in industry for producing glazes on pottery. The rock consisted mainly of feldspar albite and contained sodium, potassium, and aluminum silicates. Massive pneumoconiosis was present in a 35-year-old man who died following a bilateral adrenalectomy that was carried out to ameliorate a Cushing's syndrome. The patient worked from 1949 to 1953 in a mill and was exposed to finely powdered nepheline dust. He had no significant exposure to dust before or after this employment. He noticed increasing dyspnea after 1953 and in 1955 exhibited cyanosis during exercise. He had had three attacks of pneumonia since 1957. Pulmonary function studies demonstrated a moderately severe diffusion defect. Lung volume measurements and tests for ventilation and intrapulmonary gas mixing were within normal limits.

Grossly, the lungs had areas with wrinkled pleura that exhibited organizing fibrinous and fibrous adhesions. Sections of the lung were firm and rubbery. Irregular pigmentation and gross emphysema were present in the apical segment of the left upper lobe. Upon analysis, ash formed 26.2% of the dry weight and total silica 14.3%. Free silica was absent, and silicate comprised 54.7% of the ash.

Microscopically, dust was observed in phagocytes, and there was a close intercellular net of argyrophil fibers which involved the pulmonary arterial system. In areas with heavy dust deposition, intra-alveolar exudates with fibrin, dust, macrophages, and coniophages were observed. Small pulmonary arteries were occluded by intimal thickening, and there were areas of focal necrosis and cavitation. Focal emphysema was not found. The pathologic changes are shown in microphotographs. —L.H.M.

Medical Care Administration

What Blue Cross Must Do to Survive. M. M. Davis.* Mod. Hosp. 94:74 (Feb.) 1960. (*Washington, D. C.)

The basic Blue Cross policy with community rates and with a goal of reaching the whole community for service is being destroyed. Insurance companies are undercutting Blue Cross by offering policies at lower rates to employed groups with favorable age, sex, or occupational composition. The public is increasingly sensitive to rising charges and is ready to start investigations, make demands, and propose legislation.

To whom is Blue Cross responsible? In 1948 the American Hospital Association issued the statement that Blue Cross began from hospitals and it belonged to hospitals. Since that time changes have taken place that render the statement only half true. Today it is obvious that Blue Cross has a responsibility to its 50 million subscribers as well as to hospitals, for Blue Cross is spending a billion and a half dollars a year of its subscribers' money.

Development of nationwide Blue Cross contracts is stalled because Blue Cross cannot and Blue Shield will not offer a sufficiently broad scope of physicians' services. There is a demand for ambulatory diagnostic services. The existence of an economic incentive to unnecessary hospitalization cannot be denied when prevalent insurance plans will pay for hospitalized illness or surgery but will not pay for ambulatory or home care.

Blue Cross plans and hospitals must make a move to enlist subscribers in their battle for Blue Cross. They have a common interest in broad benefits, economical administration, and a nonprofit community.

Blue Cross must work with government, especially state government, in order to set up uniform systems of accounting and statistics as well as minimum standards that go further than fire protection. There can be no doubt that government will have to be in the insurance picture more than in the past in financial ways and in regulatory ways. It is time that Blue Cross, the hospitals, subscribers, and government put their heads together for a common purpose. —A.B.

Medical Care and Rehabilitation Under the New York Workmen's Compensation Program. L. S. Reed.* Am. J. Pub. Health 50:1264 (Sept.) 1960. (*Cornell University, Ithaca, N. Y.)

The workmen's compensation program in New York is similar to that in most other states. It covers all employers in all hazardous industries and employers in all other industries with three or more employees. The employer may take out insurance or may self-insure. Injured employees are entitled to full medical care without limitations and cash benefits in the case of temporary, permanent-partial, and permanent-total disability. The plan functions through private carriers, including a competitive state fund and a small number of self-insured employers. Medical care is provided on a free choice, fee-for-service basis. Physicians must be authorized to provide service and must have received a rating as a general practitioner, a general practitioner qualified in a specialty field, or a specialist. Ratings are by the county medical societies except in those with more than 1,000,000 population, where it is made by the Medical Practice Committee appointed by the board chairman. Responsibility is placed on the county society for the disciplining of physicians who behave improperly or unethically. There is a fee schedule which compares favorably with the Blue Shield plans in the state but is considerably higher than the New York Medicare program's schedule. Most hospitals are paid their regular charges.

Opinion is that most patients obtain excellent care because they have free access to medical care, all barriers of expense removed. Some get into the hands of unqualified physicians with the results that disability is prolonged or the worker

is left with a permanent disability that could have been avoided. There is a failure to refer for rehabilitation. There is much complaint by carriers of prolonged, unnecessary, or "over treatment." It appears that existing controls of abuse are not functioning properly.

There seems to be a basic need for supervision of medical care by the Compensation Board. It needs to be responsible for all phases of the medical program including hospitalization on a per diem cost basis. —A.B.

Internal Medicine

Anthracosilicosis. R. T. Cathcart,* P. A. Theodos and W. Fraimow. Arch. Int. Med. 106:368 (Sept.) 1960. (*Barton Memorial Division, Jefferson Medical College Hospital, Broad and Fitzwater Streets, Philadelphia 47, Pa.)

The authors studied some 1,690 men who had previously worked as hard-coal miners for an average of 25 to 30 years. They were impressed by the frequent lack of correlation between symptoms and the severity of the lesion as demonstrated by x-ray examination. Since symptoms are usually caused by a ventilatory dysfunction, they are closely related to the degree of pulmonary emphysema rather than to the stage of silicosis.

In 10.8% of the patients, x-ray evidence of cavitation was present. Evidences of tuberculous infection were demonstrated in 68% of these cases. Subsequent follow-up led to the assumption that 18% of the cavities were secondary to ischemic necrosis.

Lung biopsy proved helpful in the establishment of the diagnosis in the presence of equivocal x-ray findings. —L.W.

Further Observations on the Permanence of Tetanus Antitoxin. J. M. Ruegsegger.* Arch. Int. Med. 106:410 (Sept.) 1960. (*Medical Research Section, Lederle Laboratories, Pearl River, N.Y.)

Serial titrations at annual intervals revealed the sera of children who had previously received tetanus toxoid to have at least a minimal protective content of antitoxin at the end of four years. Very small intracutaneous injections of toxoid in adults produced an adequate antibody titer even though the last preceding stimulus may have been administered 20 years earlier.

The author doubts the need for routine antitoxic prophylaxis of wounds among patients who have received toxoid injection at an earlier time. Booster inoculation (plus penicillin or broad spectrum antibiotics in extensively contaminated cases) should provide adequate protection.—L.W.

Clinical Diagnosis of Tracheal Adenoma (Cylindroma): Report of a Case. A. I. Kleinman* and I. Levine. J.A.M.A. 171:2080 (Dec. 12) 1959. (*232 Lincoln Place, Brooklyn, N. Y.)

The symptoms of tracheal tumors may mimic bronchial asthma; however, on careful observation, it may be seen that the wheezing is more inspiratory than expiratory.

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The case presented was complicated in that the patient was allergic to house dust and a number of foods. As time went on, her chest circumference increased 4 inches, and she developed an inspiratory stridor. Repeated chest x-ray films were interpreted as normal; however, on two lateral films, there was a density in the upper mediastinum suggestive of an intratracheal lesion. Tomograms were then done, and the diagnosis of tracheal adenoma was made.

The diagnosis of cylindroma, regardless of its location—parotid, breast, or trachea—is usually a late one; metastases are late and slow-growing. The authors present this case to urge physicians to be on the alert and to use early tomography in any puzzling case of atypical asthma or inspiratory stridor. —S.H.S.

Noise and Hearing

Hearing Loss Among Air Force Flight-Line Personnel. L. L. Kopra.* J. Acoust. Soc. America 29: 1277 (Dec.) 1957. (*University of Texas, Austin, Texas.)

Audiograms and otological histories were obtained for 996 Air Force flight-line personnel. Although a correlation between hearing level (HL) at 4000 cps and number of total hours of exposure to aircraft noise is found, the author shows that this is a fortuitous correlation. That is, the correlation coefficient r between HL and length of exposure to noise is 0.14, between HL and age is 0.30, and between age and length of exposure is 0.54; but when r for HL versus exposure, holding age constant, is calculated, its value turns out to be near zero. This implies that, although the older men have higher HL's, this must be ascribed to some time-linked cause other than exposure to aircraft noise. —W.D.W.

Hearing of Naval Aircraft Maintenance Personnel. W. D. Ward.* J. Acoust. Soc. America 29:1289 (Dec.) 1960. (*327 S. Alvarado St., Los Angeles 57, Calif.)

Results similar to those of Kopra [see the preceding abstract] were obtained among naval flight-line personnel. A sample of 956 audiograms of personnel at a naval air station was divided into two groups: 379 audiograms from men with little or no exposure to aircraft noise and 579 from men with some history of regular exposure. Although significant differences between the hearing levels of the two groups could be demonstrated, it is shown that these differences can be attributed to the fact that the men exposed to the greatest amount of noise also had been exposed to more gunfire. The conclusion that, except in unusual cases, current exposures to aircraft noise do not constitute an important hazard to hearing is further supported by a follow-up study seven months later on men in three squad-

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rons of jet aircraft. No additional hearing loss was measured. —W.D.W.

Brief Tone Audiometry. J. D. Harris,* H. L. Haines, and C. K. Myers. A.M.A. Arch. Otolaryng. 67:699 (June) 1958. (*U. S. Naval Medical Research Laboratory, Submarine Base, New London, Conn.)

The authors studied energy integration by the ear under conditions similar to those used by Miskolczy-Fodor. The use of disturbances to integration as a clinical test received particular consideration. Selected patients were studied in great detail. The results are summarized in the paper for each of 25 patients. From these studies, the authors conclude that traumatic lesions of the organ of Corti produce atypical integration data and the slope of integration is proportional to the extent of the lesion. They found that not all cases of intracochlear disorders produce atypical integration. Integration data did not allow separation of "conductive" and "perceptive" components in all patients. Neither did atypical integration data always and only accompany recruitment. The lack of correspondence between integration data and recruitment is thought to make the Miskolczy-Fodor test potentially more valuable. The authors think the test has a real place in a completely equipped diagnostic clinic. —H.O.P.

Dimensional Analysis of Cochlear Models. J. Tonndorff.* J. Acoust. Soc. America 32:493 (April) 1960. (*University Hospital, Iowa City, Iowa.)

Dimensional analysis, a method for making two systems which are to be compared physically similar from the functional standpoint, has been applied by the author to a cochlear model. In the amplitude domain, the results suggest a relation between the levels at which harmonic distortion becomes audible in the human ear and those at which Békésy's eddies first become visible in a particular model of the ear. These findings support similar suggestions derived from previously published studies on cochlear models. —H.O.P.

Dermatology

Boxing Gloves in Dermatology. E. R. Gross.* A.M.A. Arch. Dermat. & Syph. 82:266 (Aug.) 1960. (*Wilmington, Del.)

This article calls attention to a simple, socially acceptable, inexpensive, mechanical deterrent to noctural excoriation. As a part of the selling program, the author keeps a set of boxing gloves in his office and loans a pair to the itching patient for one week when indicated. He has found there is no hesitancy about purchasing a pair if this therapeutic measure proves effective.

Note: Scratching at night, whether conscious or unconscious, is one of the primary factors responsible for the perpetuation of pruritic "neurodermatoses." —L.J.M.

Curettage and Electrodesiccation in the Treatment of Skin Cancer. J. M. Knox,* T. W. Lyles, E. M. Shapiro, and R. D. Martin. A.M.A. Arch. Dermat. & Syph. 82:197 (Aug.) 1960. (*Department of Dermatology, Baylor University College of Medicine, Houston, Texas.)

John M. Knox and co-workers present the case for curettage and electrodesiccation in the treatment of skin cancer. An evaluation is presented of the results obtained in 345 patients with 765 epitheliomas of the basal- and squamous-cell types which were treated by curettage and electrodesiccation. In the group followed for five years or longer, the cure rate was 96.7%. The cure rate for all 765 lesions was 98.3%. In the latter analysis, maximum followup was 19 years and minimal 6 months. Recurrences were not a problem, and no metastases or deaths were noted. Curettage and electrodesiccation would thus seem to provide an efficient, practical, controllable, cosmetically satisfactory modality for the treatment of skin cancer. —L.J.M.

Dihydroxyacetone. P. B. Mumford.* Brit. J. Dermat. 72:279 (July) 1960. (*Manchester and Salford Hospital for Skin Diseases, Manchester 3, England.)

The active agent in cosmetic preparations designed to "tan" the skin is reported to be dihydroxyacetone (D.H.A.), a white crystalline powder soluble in 1 part of water and 15 parts of alcohol. Although the exact chemical nature of the color reaction is uncertain, it is probable that a compound is formed by one of the hydroxyl radicals of D.H.A. with amino acids in the superficial layers of keratin, followed by complex polymerization resulting in production of a brown pigment in several hours. The pigment is not melanin. Mumford then describes his experiences with an experimental formula containing 2.5% D.H.A., 2.5% glycerin, 33% methylated spirits, and water to 100. The author was unimpressed with the cosmetic results obtained. Moreover, the pigment formed did not diminish the response to ultraviolet radiation. On the skin of 32 normal and 10 eczematous persons, there were no evidences of irritation or complaint of local discomfort. —L.J.M.

Erythema Nodosum in Primary Histoplasmosis. J. A. Little* and A. J. Steigman. J.A.M.A. 173: 875 (June 25) 1960. (*Children's Hospital, University of Louisville School of Medicine, Louisville, Ky.)

Although erythema nodosum long has been regarded as an allergic response associated with drug ingestion and bacterial, mycobacterial, viral, and mycotic infections, its specific association with primary histoplasmosis has not been sufficiently stressed. The authors report four cases in children demonstrating this relationship between primary histoplasmosis and erythema nodosum. —L.J.M.

About the Authors

► LESLIE W. KNOTT, M.D., M.P.H., is senior author of the lead article in this issue, "World Health and Industrial Medicine."

Dr. Knott is Assistant Chief, Division of Special Health Services, Bureau of State Services, in the U.S. Public Health Service. His entire professional career has been in the P.H.S., beginning with an internship in the U.S. Marine Hospital in Chicago, Ill., followed by successive assignments in Washington, D.C., in Springfield, Ill., and two years with the E.C.A. Mission to Greece. Since 1949 he has had a succession of assignments in Washington, receiving his present one in 1958.

Dr. Knott received the A.B. degree from Occidental College in Los Angeles, Calif., in 1933, the M.D. from the University of Southern California School of Medicine in 1939, and the M.P.H. degree from The Johns Hopkins School of Hygiene and Public Health, Baltimore, Md., in 1942. He is a member of Phi Beta Kappa, honorary scholastic fraternity, and is certified in Public Health by the American Board of Preventive Medicine.

Dr. Knott is a member of the American Medical Association and the American Public Health Association. He has received several awards for distinguished public service, including the Gold Cross, Order of George I of Greece.

► HENRY N. DOYLE, B.S., Ch.E., is currently serving as Chief, State Services Branch, Division of Occupational Health, Public Health Service, U.S. Department of Health, Education, and Welfare.

Mr. Doyle's service in the field of occupational health has been extensive and varied. After doing graduate work at Louisiana State University, where he received his Bachelor of Science degree in Chemical Engineering in 1934, he was employed as a chemical engineer by the Masonite Corporation of Laurel, Miss.

After a five-year association with Masonite, Mr. Doyle entered the Public Health Service in August, 1941. Except for a brief assignment with the Division of Sanitary Engineers, he has served continuously with the Division of Occupational Health. His assignments have included Regional Industrial Hygiene Consultant; Chief, Industrial Hygiene Field Station; Chief, State Aid Branch; and Assistant Chief, Occupational Health Program. His various foreign assignments have brought him to the Orient, Central America, and Europe. He is a Sanitary Engineer Director in the Commissioned Corps of the Public Health Service.

Mr. Doyle is the author of 26 technical reports and papers relating to occupational health. He is a member of the American Conference of Governmental Industrial Hygienists, the American Industrial Hygiene Association, and the American Public Health Association. He is co-author of the article in this issue, "World Health and Industrial Medicine."

► JAMES J. LAWSON, M.D., is Medical Supervisor at the E. I. du Pont de Nemours and Company plant at New Johnsonville, Tenn., a unit of that firm's Pigments' Department. The medical department of this plant was organized by Dr. Lawson in 1958.

Dr. Lawson graduated in medicine from Tufts College Medical School, Boston, in 1949, and for the next five years served in the U.S. Navy. His Navy assignments were an internship at the U.S. Naval Hospital, Bethesda, Md.; brief residencies in orthopedics and submarine medicine; practice and research at the Naval Submarine Medical Research Laboratory, New London, Conn.; and industrial medical work at the Naval Shipyard, Bayonne, N. J.

Dr. Lawson's Navy experience was followed by two years in general practice at New Market, Va., and two years' work as a staff physician in the Wilmington, Del., office of the du Pont Company. He is the author of "The Toxicity of Titanium Tetrachloride," in this issue.

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About the Authors

► ADOLPH J. GERL, M.D. is a native of Czechoslovakia. He graduated in medicine from the German University in Prague in 1926, and continued postgraduate studies for three years in Vienna. He became associated with the medical department of Consolidated Edison Company of New York, Inc. in 1944, and was appointed Assistant Medical Director in 1951.

Dr. Gerl is certified by the American Board of Internal Medicine. He is a Fellow of the American College of Physicians, a clinical associate in medicine at New York Medical College, and an associate visiting physician at Metropolitan Hospital. He is a co-author of the article in this issue, "Periodic Health Examinations: A Long Term Study, 1949-1959."

► GERARD T. MURPHY, M.D., is a co-author of the article in this issue, "Periodic Health Examinations: A Long Term Study, 1949-1959."

Dr. Murphy attended Heidelberg College, Tiffin, Ohio, from which institution he received the A.B. degree in 1948. He received the M.D. degree from Stritch School of Medicine of Loyola University, Chicago, in 1952. Thereafter he interned at St. Vincent's Hospital, New York City; and served a residency in medicine at Martland Medical Center in Newark, N. J., and at the U.S. Veterans' Administration Hospital in Brooklyn, N. Y.

Since 1957 Dr. Murphy has been associated with the Diagnostic Clinic in the Medical Department of Consolidated Edison Company of New York, Inc. He is a clinical instructor in medicine, State University of New York College of Medicine at New York City, Brooklyn.

► JAMES KAWCHAK, M.D., is author of the article in this issue "Ceruminosis, a Factor in Audiometry." He is Physician-in-Charge, Medical Section, Central Staff Office, Ford Motor Company, Dearborn, Mich.

A native of Pennsylvania, Dr. Kawchak entered The Duke University, Durham, N.C., on an athletic scholarship in 1943. He served in the infantry of the U.S. Army during the years 1944-1946 and was discharged with the rank of lieutenant. He returned to Duke in 1947 for completion of college studies and subsequent medical education. He was elected to Phi Beta Kappa in 1949. He received the M.D. degree in 1952.

After a rotating internship at The General Hospital of Fresno County, Fresno, Calif., Dr. Kawchak began a residency in internal medicine at that place. This was continued at the U.S. Veterans Administration Hospital at Richmond, Va., and at Tulare-Kings Counties Hospital for pulmonary diseases, Springville, Calif. He joined the medical department at Ford in 1956. He is a member of the American Medical Association, the American Thoracic Society, and IMA.

► REINIER L. ZIELHUIS, born in 1921, graduated from the University of Groningen in 1948. After serving two years as medical officer in the Royal Dutch-Indonesian Army in Indonesia, he was employed for another four years as general physician attached to a bauxite and mining company (Billiton Co. Ltd.) in the Riau Archipelago. In 1954 he returned to the Netherlands and followed a course in preventive and occupational medicine at the Netherlands Institute for Preventive Medicine at Leyden, Netherlands. In 1955 he was appointed as staff member at the Department of Occupational Medicine in this Institute, and has since engaged in research toxicology.

From 1955-1959 Dr. Zielhuis made an investigation into the medical conditions in the Dutch lead-processing industries, with special emphasis on the possibilities of medical prevention. The results of these investigations were published as a thesis, for which he received the degree of Doctor of Medicine from the University of Leyden in 1959.

Dr. Zielhuis is a member of a national committee for labeling of paints, and consequently is interested in paint toxicology. As an extension of this, at present he is working especially in the field of industrial toxicology of solvents and plastics. He has published some papers on general problems of occupational medicine and toxicology, and some on the medical prevention of lead intoxication. As part of his work at the Institute he also has the medical supervision of some factories in the Leyden area. Dr. Zielhuis is author of the article in this issue, "An Investigation of Systemic Toxicity from Exposure of Epoxy Resins, Hardeners, and Styrene."

► RODERICK MACDONALD JR., M.D. is author of the article in this issue on "Injuries to the Eye," the fourth in a series of reviews on industrial trauma coming from the University of Louisville. He is Assistant Professor of Ophthalmology, the University of Louisville School of Medicine.

Dr. Macdonald graduated in 1947 from Davidson (N. C.) College with a B.S. degree in chemistry and biology, and received the M.D. degree from the Medical College of South Carolina at Charleston, S.C., in 1950. After a rotating internship at the Baltimore (Md.) City Hospitals he entered training in ophthalmology at the New Orleans (La.) Eye, Ear, Nose, and Throat Hospital. This was interrupted by two years of service as an ophthalmologist in the U.S. Army, after which training was completed in New Orleans serving at this time also on the faculty of ophthalmology at Tulane University School of Medicine. He joined the faculty at Louisville in 1957.

Dr. Macdonald is the author of four previously published articles on ophthalmology. He holds memberships in several medical societies, including The Association for Research in Ophthalmology. He is a Fellow of the American Academy of Ophthalmology and is a Diplomate of the American Board of Ophthalmology. —EDITOR

Announcement

Applications are being solicited for Scientific Exhibits for the 1961 Industrial Health Conference which will be held in Los Angeles. Exhibits will be shown April 11 to 13. Application blanks and information may be obtained from HOMER E. ELMQUIST, M.D., Chairman of Scientific Exhibits Committee, 629 S. Westlake Ave., Los Angeles 57, Calif.

People and Events

► CHARLES E. LEWIS, M.D., Sc.D., has made two changes in his professional activities. On the first of this year he became an Assistant Editor of the JOURNAL OF OCCUPATIONAL MEDICINE and on the same date he joined the faculty of the University of Kansas School of Medicine at Kansas City, Kan. In the former appointment he will assist generally in the editorial work of the JOURNAL. At Kansas he will be Associate Professor of Preventive Medicine and Public Health. The appointment includes responsibility for the functions of the employee and student health services at the University's Medical Center. In addition, he will pursue his research interests and teaching in the fields of epidemiology and environmental health.

DR. LEWIS attended undergraduate schools at the University of Kansas City and the University of Kansas, majoring in chemical engineering. He attended medical school at Harvard University and graduated with the M.D. degree in 1953. After an internship at the University of Kansas Medical Center, he started a residency in Internal Medicine at this institution, but was called to active duty with the U.S. Air Force and served the next two years in Southeast Asia.

In 1956 DR. LEWIS entered graduate training in occupational medicine as a Fellow of the Kettering Laboratory of the University of Cincinnati, receiving his M.S. degree the following year. As a part of this program, he served an in-plant year at Eastman Kodak Company, Rochester, N.Y. He received the Sc.D. degree from the University of Cincinnati in 1959. From May of 1959 until his present appointment, DR. LEWIS was associated with the Texas Eastman Company, Longview, Tex. During this time he has also held an appointment as Clinical Assistant Professor of Epidemiology at the Baylor University College of Medicine, Houston, and has been a Director-at-Large of the Texas State Tuberculosis Association.

DR. LEWIS is the author of several articles in the field of industrial medicine and toxicology. He is a member of the Industrial Medical Association, serving on its Toxicology Committee. He is also a member of the American Industrial Hygiene Association, the American Public Health Association and Sigma Xi.

Charles E. Lewis, M.D.

► JOHN M. BISHOP, M.D., has been appointed Assistant Medical Director, Manhattan-Bronx-Westchester territory of the New York Telephone Company. He will be associated with KENNETH L. STRATTON, M.D., Medical Director.

DR. BISHOP received his M.D. degree from the University of Illinois in 1948. He then joined the U.S. Public Health Service and interned at the Public Health Service Hospital in Seattle, Wash. He completed a three-year surgical residency and served for one year as a staff surgeon at the same hospital.

In 1953, the Public Health Service assigned him to Europe, first as the physician for the American Embassy in Paris, and later as Medical Officer in Charge of Medical activities under the Refugee Relief Program in Europe, North Africa and the Middle East.

Late in 1956 he returned to the U.S. to become Deputy Director of the Public Health Service Hospital in San Francisco. The following year he resigned from the Service to enter private practice as a surgeon. At the time of his discharge from active duty he held the rank of Senior Surgeon (Commander) in the Public Health Service.

John M. Bishop, M.D.

DR. BISHOP practiced in Seattle for two years and during this time also worked as a medical hospital consultant in the Pacific Northwest designing and planning community hospitals. In 1959 he moved to New York to work as the Deputy Secretary General of the World Medical Association. Later, he served as an international medical program consultant for the American Medical Association and other related medical groups. He is the author of a 300-page survey report prepared for the AMA on international medical and health activities of American organizations.

► W. WAYNE STEWART, M.D., has been named Medical Director of Sun Oil Company, Philadelphia, Pa. As Medical Director, DR. STEWART will be responsible for carrying out the long range preventive medical program for the company's 18,000 employees both in domestic and foreign operations. He joined Sun as a consultant in 1952 and has acted as physician-in-charge of the medical program since 1958.

DR. STEWART is a graduate of Miami University (Ohio) and Hahnemann Medical College, Philadelphia, receiving his M.D. degree in 1943. After serving as a Naval lieutenant commander during World War II, he continued postgraduate work at St. Luke's and Children's Medical Center in Philadelphia and in 1949 entered private practice as a specialist in chest diseases.

He is on the staffs of Hahnemann

People and Events

and Rush Chest Hospitals, Philadelphia and Crozer and Chester Hospitals, Chester, Pa. He is also director of Philadelphia's Penn Center Medical Clinic, which specializes in industrial medicine. DR. STEWART'S professional associations include the Industrial Medical Association and the American Medical Association. He is also on the American Petroleum Institute's Medical Advisory Council.

James H. Sterner, M.D.

Melvin N. Newquist, M.D.

► JAMES H. STERNER, M.D., has been named Chairman of the Council on Occupational Health of the American Medical Association, with MELVIN N. NEWQUIST, M.D., as Vice-Chairman. The appointments, made by the AMA's Board of Trustees at the recent Clinical Sessions in Washington, D.C., became effective January 1, 1961. Retiring chairman, WILLIAM P. SHEPARD, M.D., and retiring Vice-Chairman, ROBERT A. KEHOE, M.D., remain as members of the Council.

DR. STERNER is Medical Director of Eastman Kodak Company, Rochester, N.Y.; Associate Professor of medicine at the University of Rochester; and a consultant to the U.S. Atomic Energy Commission. He graduated from Harvard University Medical School in 1932, served his internship and later trained in internal medicine at Lankenau Hospital, Philadelphia. In 1934 he organized the Laboratory of Industrial Medicine of the Eastman Kodak Company. He became Associate Medical Director in 1949 and Medical Director in 1951.

DR. STERNER is President of the American College of Preventive Medicine, a past president of the American Academy of Occupational Medicine and a recipient of the Industrial Medical Association's Knudsen Award. He is also a trustee and Vice-Chairman for Occupational Medicine of the American Board of Preventive Medicine.

DR. NEWQUIST retired in March, 1959, as Medical Director of The Texas Company, a position he held for 20 years. Since that time he has been doing consulting work. He obtained his M.D. degree from the University of Nebraska in 1924, and served his internship at the University Hospital in Omaha. He spent the next five years in private practice, then became Assistant Director and field representative for the American College of Surgeons where he remained until 1939.

DR. NEWQUIST was president of the Industrial Medical Association, 1945-46. He is Vice-President for Occupational Medicine of the American College of Preventive Medicine, and a member of the Joint Committee on Medical Care for Industrial Workers of the AMA's Council on Medical Service and Council on Occupational Health.

The Occupational Health Institute's Certificate of Health Maintenance recently was awarded to David M. Lea & Company, Richmond, Virginia. The presentation was made by R. Lomax Wells, M.D., Chief Medical Officer for the Chesapeake and Potomac Telephone Companies. Pictured above following the presentation are (left to right) John Good, M.D., Philena Redic, R.N., Dr. Wells, and Henry Copley, M.D.

► ROBERT L. LEMBKE, M.D., has recently been appointed Staff Physician in Continental Oil Company's Medical Division, with headquarters in Ponca City, Okla.

DR. LEMBKE received his bachelor's degree in 1939 from Northwestern State College, Alva, Okla. He served in radar and intelligence with the U.S. Naval Service during World War II, and enrolled in the University of Oklahoma School of Medicine following the war, receiving his doctor of medicine degree in 1950. For the past nine years DR. LEMBKE has been practicing general medicine at Pryor, Okla., where he has been consulting physician to National Gypsum Company, Midwest Carbide Company, Oklahoma Ordnance Company, Grand River Dam Authority and other area organizations. He is a member of the Industrial Medical Association and the American Medical Association.

► GLENN G. HENDRICKSON, M.D., has been appointed Medical Director for Lago Oil & Transport Company, Aruba, N.W.I. He succeeds RUSSELL C. CARRELL, M.D., retired.

DR. HENDRICKSON attended Vanderbilt University School of Medicine and received his M.D. degree in 1940. He has been Chief Surgeon at Lago Hospital, Aruba, since 1947. He is a Diplomate of the American Board of Surgery, a Fellow of the American College of Surgeons, and a member of the Industrial Medical Association.

► H. W. GARTON, M.D., retired on December 1 after 37 years as Plant Physician at the General Electric Company's Fort Wayne, Ind., plant. He is succeeded by JAMES A. CHASE, M.D., who has been in private practice for the past four years.

DR. GARTON graduated from Indiana University School of Medicine in 1921 and served his internship at Marion County General Hospital in Indianapolis. He is a past president of the medical staff at St. Joseph's Hospital, and is currently on the Medical Advisory Council of both the Indiana Association of Industrial Nurses and the Fort Wayne Area Industrial Nurses Association. He is a Fellow of the Industrial Medical Association.

DR. CHASE graduated from the University of Indiana School of Medicine in 1955; he interned at Harrisburg, Pa., Hospital before entering private practice. He is currently President of the Noble County Medical Society.

► EARL M. BEST, JR., M.D., has been appointed to the newly created position of Medical Director of the Technical Center, Chemicals and Olefins Companies, Division of Union Carbide Corporation at South Charleston, W. Va.

DR. BEST joined Union Carbide Chemicals Company in 1954 and has served in the capacity of Plant Physician at the South Charleston plant. He received his M.D. degree from the University of Tennessee College of Medicine in 1943. After serving his internship at Jackson Memorial Hospital, Miami, Florida, DR. BEST joined the U.S. Army and was assigned to the 117th General Hospital in the European theater.

Following his army service he

Earl M. Best, Jr., M.D.

was Company Physician at Olga Coal Company, Caretta, W. Va. for three years. From 1949 to 1951 he was a resident in pediatrics at Grady Memorial Hospital, Atlanta, Ga., following which he practiced pediatrics in Chattanooga, Tenn.

Dr. BEST'S professional affiliations include the American Medical Association, the American Academy of Occupational Medicine and the American Industrial Hygiene Association. He is also a member of Phi Rho Sigma medical fraternity.

► LYDIA G. GIBERSON, M.D., was recently honored by the Business and Professional Women's Clubs of New York as "The Outstanding Professional Woman of the Year." The presentation of the award was made at a reception held at Gracie Mansion, the mayor's residence, on October 6 during National Business Women's Week. DR. GIBERSON, who is Assistant Vice-President of the Metropolitan Life Insurance Company, was cited as one who "has worked her way up in her field of specialization—industrial medicine —to her present policy-making position . . . has manifested throughout her career the characteristics of personal leadership, emotional stability and mental acumen."

► ROBERT A. KEHOE, M.D., recently presented the Harben Lectures at the Royal Institute of Public Health and Hygiene in London, England. The invitation to present these lectures is an honor seldom accorded an American. DR. KEHOE is Director, Kettering Laboratory, University of Cincinnati School of Medi-

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People and Events

cine. His topic was "Metabolism of Lead in Man in Health and Disease."

► CAPT. DAVID MINARD, MC, USN, has been awarded the Gorgas Medal for his work in the field of preventive medicine as related to heat stress. The award, which was established in 1942 by the Wyeth Laboratories in memory of MAJ. GEN. WILLIAM C. GORGAS, consists of a silver medal, a scroll, and an honorarium of $500. CAPTAIN MINARD is head of the Thermal Stress Control Branch, Bureau of Medicine and Surgery, Washington, D.C., and he serves the JOURNAL OF OCCUPATIONAL MEDICINE as head of the abstract section on Environmental Physiology. The medal was presented to him at the Honors Night Dinner of the Association of Military Surgeons.

► Industrial Hygiene Foundation observed its silver anniversary of progress in safeguarding industrial health, on the occasion of its 25th Annual Meeting at Mellon Institute, Pittsburgh, October 26 and 27.

Established at the Institute in 1935, the nonprofit Foundation now has some 400 member organizations among companies and industrial associations throughout the nation. Nearly 500 officials of these groups gathered at the meeting to hear discussions by experts in industry, insurance, government, law, medicine, and science.

The latest developments in several major problems were reported by a battery of authorities at the all-day Management Conference on October 26. "Group Insurance—A Mounting Production Cost," the topic for the morning, was discussed by E. T. KLASSEN, American Can Co., R. R. SHINN, Metropolitan Life Insurance Co., and J. F. MCCAHAN, M.D., Western Electric Co.

A discussion of "Effects of Food Additives Legislation on Food Technology" was also presented at the Management Conference. ANNA M. BAETJER, Sc.D., of Johns Hopkins University was moderator of the panel which included K. E. MULFORD, Atlas Powder Co., L. A. COLEMAN, Allied Chemical Corp., and D. B. HAND, Cornell University.

The final topic at the Management Conference was "Standards for Air Quality," a discussion of trends in municipal air pollution legislation. The speaker was V. G. MACKENZIE, Chief of the Division of Air Pollution, U. S. Public Health Service.

At the Joint Medical-Legal Conference a panel discussion on "Emphysema, Pneumoconioses, and Compensation" was moderated by V. P. AHEARN, National Industrial Sand Associates. The panel members were: O. A. SANDER, M.D., Marquette University; A. J. VORWALD, M.D., Wayne State University; G. W. WRIGHT, M.D., Saint Luke's Hospital; and W. C. HARTMAN, Squire, Sanders & Dempsey.

A panel discussion on "Methods of Measuring Work Capabilities of the Individual" was the major part of the Medical Conference, with J. P. HUGHES, M.D., of Kaiser Alumi-

Pictured at the 25th Annual Meeting of the Industrial Hygiene Foundation in Pittsburgh are:

Left, above: Participants in the panel discussion on "Effects of Food Additives Legislation on Food Technology." From left to right: L. A. Coleman, K. E. Mulford, Anna M. Baetjer, Sc.D. (moderator), D. B. Hand, and K. W. Smith, M.D. (Chairman).

Left: Participants in the panel discussion on "Emphysema, Pneumoconioses and Compensation." From left to right (seated): T. C. Waters, V. P. Ahearn (moderator), W. C. Hartman, and (standing): A. J. Vorwald, M.D., G. W. Wright, M.D., and O. A. Sander, M.D.

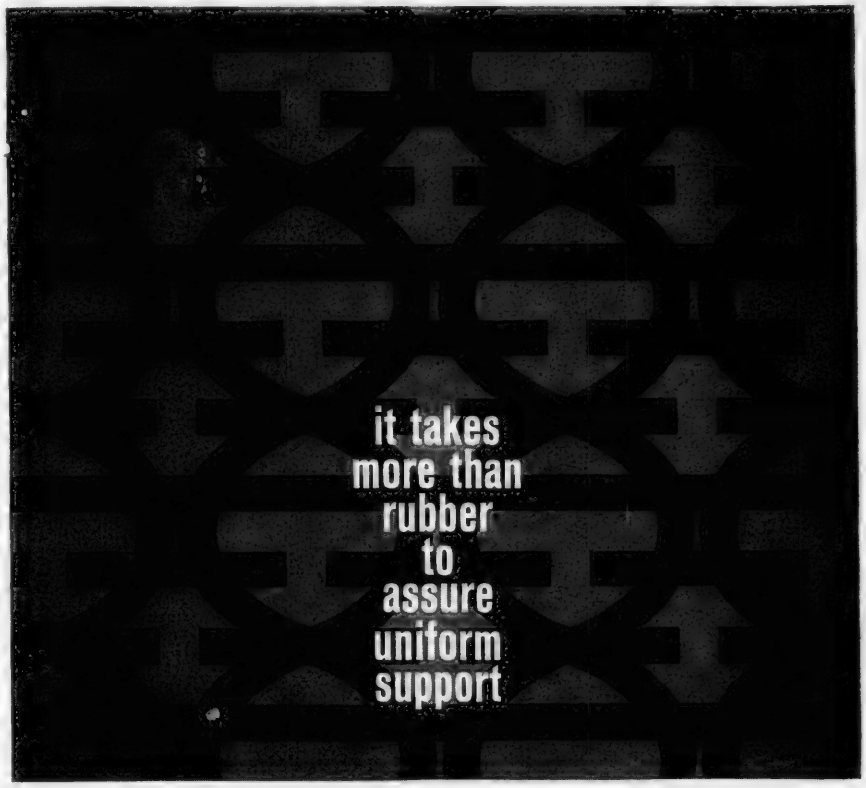
Above: Participants in the panel discussion on "Group Insurance—A Mounting Production Cost." From left to right (seated): E. T. Klassen, J. F. McCahan, M.D., and (standing): R. R. Shinn, and W. P. Yant, Sc.D.

num and Chemical Corp. acting as moderator. L. W. GREGG, Ph.D., Carnegie Institute of Technology, discussed the prediction of human tolerance to stresses of specific jobs. H. S. BELDING, Ph.D., Graduate School of Public Health, University of Pittsburgh, described instrumentation that makes possible remote monitoring of a worker's physical and psychological strains without interfering with his activity. W. H. M. MORRIS, Ph.D., Purdue University, spoke on the "Physiological Approaches to Evaluational Capabilities." "Usefulness of Procedures of Health Examinations" was presented by W. D. DAVID, M.D., of the U. S. Public Health Service.

Aspects of workmen's compensation constituted the entire program of the Legal Conference. "Legislative Developments in Workmen's Compensation for the Year 1960" was discussed by ANDREW KALMYKOW of the Association of Casualty and Surety Companies and by D. W. STITT, Continental Can Company. H. F. MCNIECE, St. John's University School of Law, dealt with the legal basis for awards that have been made in specific cardiac cases. O. T. CLAYTON, Esso Standard Oil Company, discussed "Problems Presented to Directors of Departments of Industrial Relations in the Handling of Workmen's Compensation Claims."

In the Engineering Conference the expansion of city zoning regulations to control industrial plant locations from the standpoints of dust, smoke, noise, vibration, illumination nuisance, and toxic-matter emission, was discussed by W. T. INGRAM, American Society of Civil Engineers. Other topics included: "Acceptable Equipment and Procedures for Evaluating Air Pollution Problems" by R. O. MCCALDIN, PH.D., U. S. Public Health Service; "Benefits of Central Gas Cleaning Facilities" by C. A. BISHOP, PH.D., and G. A. HOWELL, both of United States Steel Corp.; "How Can We Achieve Better Operation of Dust Control Systems" by K. J. CAPLAN, Mallinckrodt Chemical Works; "Recent Welding Practices—Naval Facilities" by C. P. BERGTHOLDT, U. S. Naval Weapons Plant; "Legal Considerations Involved in Developing Precautionary Labels" by J. D. KITTELTON, Manufacturing Chemists' Association; and "A Progress Report on In-Plant Hazard Identification Systems" by J. J. DUGGAN, Union Carbide Chemicals Company. Recent Developments in Industrial Hygiene were discussed by H. W. SPEICHER, Westinghouse Electric Corp.; R. H. BLACKMER, General Electric Co.; N. G. WHITE, Shell Chemical Corp.; R. J. WRIGHT, American Air Filter Co.; and R. T. PRING, Dracco Division of Fuller Company.

"Chemical Antidotes for Radiation Injury" was discussed by JOHN DOULL, M.D., USAF Radiation Laboratory, University of Chicago, at the Chemical-Toxicological Conference, with emphasis on the necessity for awareness of hazards in the development of new rocket fuels "from test-tube to launching pad." J. A. CLEMENTS, M.D., Army Chemical Center, presented a paper on "Pulmonary Edema and the Permeability of the Alveolar Membranes"; and C. J. KENSLER, Ph.D., Arthur D. Little, Inc., talked on "Toxicologic Mechanisms at the Cellular Level." Fuels and their combustion products were discussed by: J. F. MORGAN, Pennsylvania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People and Events

Railroad (diesel fuels); E. B. RIFKIN, Ethyl Corporation (missile fuels); and H. M. BOWMAN, Thiokol Chemical Corporation (rocket fuels).

► The 12th Annual Meeting of the American Academy of Occupational Medicine will be held at the Statler Hotel in Detroit, Mich., February 8-10. The occasion has been developed under the direction of ARTHUR J. VORWALD, M.D., Wayne State University. THEODORE C. WATERS, LL.D., will present the annual Gehrman Memorial Lecture on the subject "Trends in Compensation Legislation and Administration." The other scientific presentations follow:

February 8: "Fundamental Principles of Biostatistics"—FELIX E. MOORE, M.D., University of Michigan; "Fundamental Principles of Epidemiology"—ALEXANDER G. GILLIAM, M.D., National Institutes of Health; "Epidemiological Methods and Community Air Pollution"—JOHN J. PHAIR, M.D., University of Cincinnati; "Application of Biostatistics and Epidemiology to Industrial Population"—THOMAS MANCUSO, M.D., Ohio State Department of Health. In the afternoon, tours will be conducted to the Rouge Plant, Ford Motor Company, the Technical Center, General Motors Corporation, and the Department of Industrial Medicine and Hygiene College of Medicine, Wayne State University.

February 9: "What Pulmonary Function Testing Can Tell the Industrial Physician"—BENJAMIN W. LEWIS, M.D., Wayne State University; "Application of Functional Tests to Pulmonary Disease Entities of Occupational Origin"—DAVID V. BATES, M.D., McGill University, Montreal; "Occupation and Pulmonary Emphysema"—GEORGE W. WRIGHT, M.D., St. Luke's Hospital, Cleveland; "Occupation and Cardiac Impairment"—RICHARD J. BING, M.D., Wayne State University; "Auditory Problems in Occupational Medicine"—MERLE LAWRENCE, Ph.D., University of Michigan.

February 10: "Skin Cancer"—LEO J. MIEDLER, M.D., University of Michigan; "Evidence for Radiation and Chemicals as Leukemogenic Agents"—EUGENE P. CRONKITE, M.D., Brookhaven National Laboratories; "Lung Cancer"—ARTHUR J. VORWALD, M.D., Wayne State University; "Trauma and Cancer"—ALAN R. MORITZ, M.D., Western Reserve University.

► The annual combined conference of the Ontario Medical Association's Section on Industrial Medicine and the Industrial Medical Association of the Province of Quebec was held October 12-14, at Britannia Hotel on the Lake of Bays. There was a total registration of more than 200 persons.

The HON. MATTHEW B. DYMOND, Minister of Health for Ontario, was the guest speaker at the opening luncheon on October 12. DR. GEORGE F. PENNAL of Toronto illustrated clinical features in the examination of the back. DR. G. D. KAY, Toronto orthopedic surgeon, assisted by playing the role of a hysterical patient with backache. DR. KENNETH W. SMITH, Medical Director, Johns-Manville Corporation, New York City, described the common pneumoconioses with radiographs. DR. HORACE W. GERARDE, Senior Research Associate, Esso Research and Engineering Company, Linden, N.J., spoke on medical research in the petroleum industry.

On October 13, DR. D. K. GRANT, Director of Medical Services, Hydro-Electric Power Commission of Ontario, gave a presentation entitled "Artificial Respiration, By Hand or Mouth?" DR. JOHN F. PATERSON, an internist, aroused interest in his talk on newer trends in tuberculosis treatment. With present-day chemotherapeutic agents, he has been able to keep many patients with active tuberculosis on the job. DR. JOHN HUNTER described some of the chief physiological effects of exposure to cold. DR. WILLIAM W. WIGLE, President of the Ontario Medical Association, attended the

Dr. E. Mastromatteo and Dr. R. G. Birrell, retiring Secretary and Chairman, respectively, of the Ontario Medical Association's Section on Industrial Medicine.

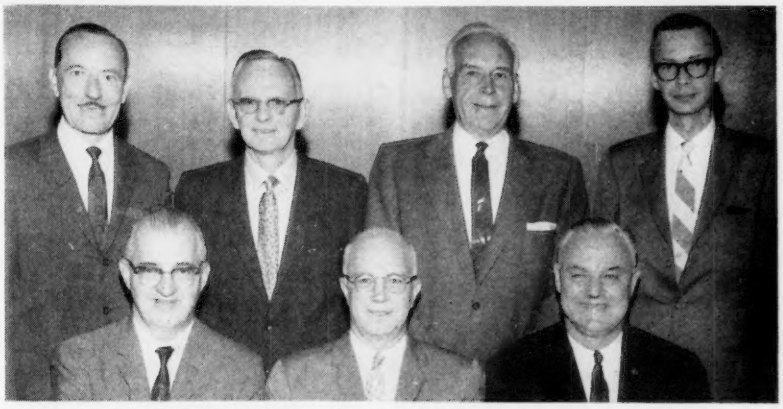
Newly elected officers of the Ontario Medical Association's Section on Industrial Medicine: Dr. J. M. Colthart (left), Secretary, and Dr. W. F. Prendergast, Chairman.

Members of the Western Industrial Medical Association convening during the Western Industrial Health Conference held in San Francisco in October.

Conference to represent the Association and also in his capacity as an industrial physician. He spoke at the luncheon on October 13. The afternoon session was devoted to ionizing radiation with the following speakers: DR. G. C. BUTLER of Chalk River spoke on hazards from ionizing radiation in atomic energy operations: DR. C. G. STEWART of Chalk River spoke about the medical effects and described the one case of clinical damage produced by accidental over-exposure in Canada's atomic energy project; and DR. L. B. LEPPARD, Chief Physicist, Division of Industrial Hygiene, spoke on the situation in Ontario with a practical viewpoint on recommended exposure levels and controls.

At the annual dinner, on behalf of the Ontario Section, DR. H. M. HARRISON made a presentation to DR. J. G. CUNNINGHAM who served for 40 years as Director, Division of Industrial Hygiene, Ontario Department of Health. This was the first such Division in Canada and the third on this Continent. DR. R. E. ECKARDT, President, Industrial Medical Association, conveyed that organization's best wishes.

DR. M. G. TOWNSEND, President of the Industrial Medical Association of the Province of Quebec, took the chair for the morning session on October 14. He announced that the Quebec group would act as hosts for the 1961 meeting in Quebec City. DR. J. H. BAILLIE, of the Bell Telephone Company of Canada, spoke on the approach to alcoholism in industry. DR. A. N. MCKILLOP then acted as panel moderator for a panel on traffic accidents and their emergency care. C. E. LAYBOURN outlined the problem as seen by a safety official of the Ontario Department of Transport; DR. A. F. W. PEART, of the Canadian Medical Association, indicated the interest of organized medicine in this subject; and DR. R. A. MUSTARD, Assistant Professor of Surgery at the University of Toronto, spoke on the emergency medical care of traffic accidents—ranging from first aid on the spot to the initial surgical care.



Newly elected officers of the Western Industrial Medical Association are (from left to right, standing): Lawrence Gerlach, M.D., Director; John H. Leimbach, M.D., Vice-President; Earl T. Dewey, M.D., Treasurer; Clyde Greene, M.D., Director; (seated): Birchard M. Brundage, M.D., Secretary; Verne G. Ghormley, M.D., Chairman, Board of Directors; Clarence Lee Lloyd, M.D., President. Not pictured are the following Directors: W. J. Rothrock, Jr., M.D., James Ryan, M.D., James P. Hughes, M.D., and Leon O. Desimone, M.D.

At the business meeting of the Ontario Section, DR. W. F. PRENDERGAST was elected Chairman and DR. J. M. COLTHART, Secretary, for the coming two years. Both are from Toronto. They will succeed DR. R. G. BIRRELL and DR. E. MASTROMATTEO respectively.

► The Fourth Annual Western Industrial Health Conference, held at the Jack Tar Hotel in San Francisco, October 7-9, had a total registration of 498 persons. This represents a gain of 167 registrants over those attending the 1958 Conference which was held in the Bay Area.

Sponsoring organizations included: Western Industrial Medical Association, Western Industrial Nurses Association, the Northern and California Sections of the American Industrial Hygiene Association, the San Francisco chapter of the American Society of Safety Engineers, the Northern California Industrial Safety Society and the American Conference of Governmental Industrial Hygienists.

► The Second Annual Symposium on Industrial Nursing was presented by the Medical Services Operation of the Missile and Space Vehicle Department, General Electric Company on December 7 at the Sheraton Hotel, Philadelphia.

The scientific program included the following: "The Red Eye" by

People and Events

RICHARD A. ELLIS, M.D., Assistant Surgeon, Willis Eye Hospital, and Associate in Ophthalmology, Graduate School of Medicine, University of Pennsylvania; "Current Status of Tetanus Immunization" by JOHANNES IPSEN, M.D., Professor of Epidemiology and Medical Statistics, School of Medicine, University of Pennsylvania; "Management of Penetrating Injuries of the Chest and Abdomen" by WILLIAM S. BLAKEMORE, M.D., J. William White Assistant Professor of Surgical Research and Assistant to the Director of the Harrison Department of Surgical Research, Graduate School of Medicine, University of Pennsylvania; "Management of Dysmenorrhea" by GEORGE L. HOFFMAN, JR., M.D., Associate Professor of Obstetrics and Gynecology, School of Medicine, University of Pennsylvania; "Management of Upper Respiratory Infections" by STANLEY GOTLIEB, M.D., Medical Director, Missile and Space Vehicle Department, General Electric Company; and "Psychiatry on a Shoestring" by A. M. ORNSTEEN, M.D., Emeritus Professor of Neurology, and Chairman of the Department of Neurology, School of Medicine, University of Pennsylvania.

► Philadelphia Section of the American Industrial Hygiene Association has invited the Industrial Medical Association of Philadelphia to attend their January meeting at which time JOHN FOULGER, M.D., will speak on "Carbon Monoxide Poisoning." The meeting will be held January 11 at the Engineers' Club of Philadelphia. DR. FOULGER, who is retired, was formerly Director of Medical Research, E. I. du Pont de Nemours and Company. He will discuss the more recent developments having to do with the chronic effects of carbon monoxide as well as the effects of acute poisoning.

► Industrial Medical Association of New Jersey held its November meeting at the Roosevelt Hospital in Metuchen, N. J. J. MAXWELL CHAMBERLAIN gave an illustrated lecture on "Civilian Injuries of the Chest." DR. CHAMBERLAIN is Attending Physician in Charge of Thoracic Surgery at Roosevelt Hospital, New York City, and Assistant Clinical Professor of Surgery at Columbia Presbyterian Medical Center. The organization's annual dinner meeting and election of officers will be held January 20 at Far Hills Inn, Somerville, N. J.

► Industrial Medical Association of Philadelphia met on November 30 at the Penn Sherwood Hotel, Philadelphia. The scientific program on "Current Status of Dermal Abrasive Techniques" was presented by FREDERICK URBACH, M.D., Associate Professor of Dermatology, Temple University Medical School.

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